LINDON NO. 1

PEP 105

WELL COMPLETION REPORT

TEXT & APPENDICES

BEACH PETROLEUM N.L.

(Incorporated in South Australia)

WCR
LINDON-1
(W841)

BEACH PETROLEUM NO LIABILITY

LINDON NO. 1
P.E.P. 105

WELL COMPLETION REPORT

By

S.M. Guba
March 1984.

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ENCLOSURES

SUMMARY

Lindon No. 1 was drilled over a 32 day period from the 1st December 1983 to the 1st January 1984 in the Heywood area of P.E.P. 105, Otway Basin, Victoria.

The well was designed primarily as a test of the Pebble Point Formation. The core had 35% irregularly distributed, moderately bright gold natural fluorescence giving a streaming bright yellow cut with a very pale natural cut colour. Only a limited concentration of gas associated with the drill break was detected.

DST-1 recovered heavily oil cut (28^{o} API, Pour Point 33^{o}C) mud. The second test recovered muddy water (3300-5600 ppm Cl^{-}). Partial flushing by meteoric waters, an ineffectively closed fault-controlled structure, a continuing but incomplete process of accumulation or limited amounts of oil reaching the structure after a long migration path are all possible reasons for the limited amount of oil found.

The well failed to encounter hydrocarbons in the other primary objective of the Waarre Formation due to a significant lack in adequate seal thickness.

Continuous fluorescence was reported in the very thin and tight sands of the secondary objective Eumeralla Formation from 2400 m displaying 40-100%, patchy, very dull gold natural fluorescence and a very weak and very slow streaming to crush cut fluorescence with a milky white colour.

The sandstones of the secondary objective Geltwood Beach Facies of the Lower Cretaceous Crayfish Formation had 2% moderately bright pinpoint to patchy, white natural fluorescence giving a weak crush to moderate streaming blue white cut. Cuttings and a drillstem test confirmed the tight nature of the sands.

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SUMMARY (Continued)

Hydrocarbon indications were not commercial and the well was plugged and abandoned.

The well was drilled by the Richter Drilling Pty. Ltd. National 80 UE Rig No.14 with the following contract services:-

Halliburton Manufacturing and Services Ltd.	- Testing and Cementing
Schlumberger Seaco Inc.	- Wireline Logging
Exploration Logging of Australia Ltd.	- Mud Logging
Baroid N.L.	- Mud Engineering

Beach Petroleum N.L. was the operator for the well, which was drilled as an earning well for Gas and Fuel Exploration. This was the final well of the series of operations whereby Gas and Fuel Exploration N.L. earn a 50% interest in P.E.P. 105.

1. PURPOSE OF WELL

The Lindon No. 1 well was designed as a test of primary targets of the basal Tertiary Pebble Point Formation and/or the top sands of the Paaratte Formation, and the basal Upper Cretaceous Flaxman-Waarre sandstone reservoir. The well was also proposed as a test of the secondary Lower Cretaceous targets of the intra-Eumeralla Formation sandstones and the Crayfish Formation.

The Lindon structure is essentially an elongate closed horst-block structure at both primary target levels with its axis trending NW-SE. It was hoped to be well placed in the basin to trap hydrocarbons migrating from the Portland Trough depocentre lying further south.

The expected section was prognosed using V.D.M.E. Heywood No. 13 and Homerton No. 4 stratigraphic bores 9 kilometres south and 20 kilometres south-east respectively. Porous and permeable sandstones of the Pebble Point Formation and Paaratte Formation have been recognised in most wells in the area including Green Banks No. 1 drilled in 1983. A thick Pember Mudstone Member was expected to provide an effective seal over these reservoirs.

The Waarre Formation is also seen in several wells immediately to the north although it is thought to pinch out along the northern margin of the Tyrendarra Embayment.

The Otway Basin in general does source both oil and gas but the source rock potential in the Lindon area specifically prior to drilling was completely unknown.

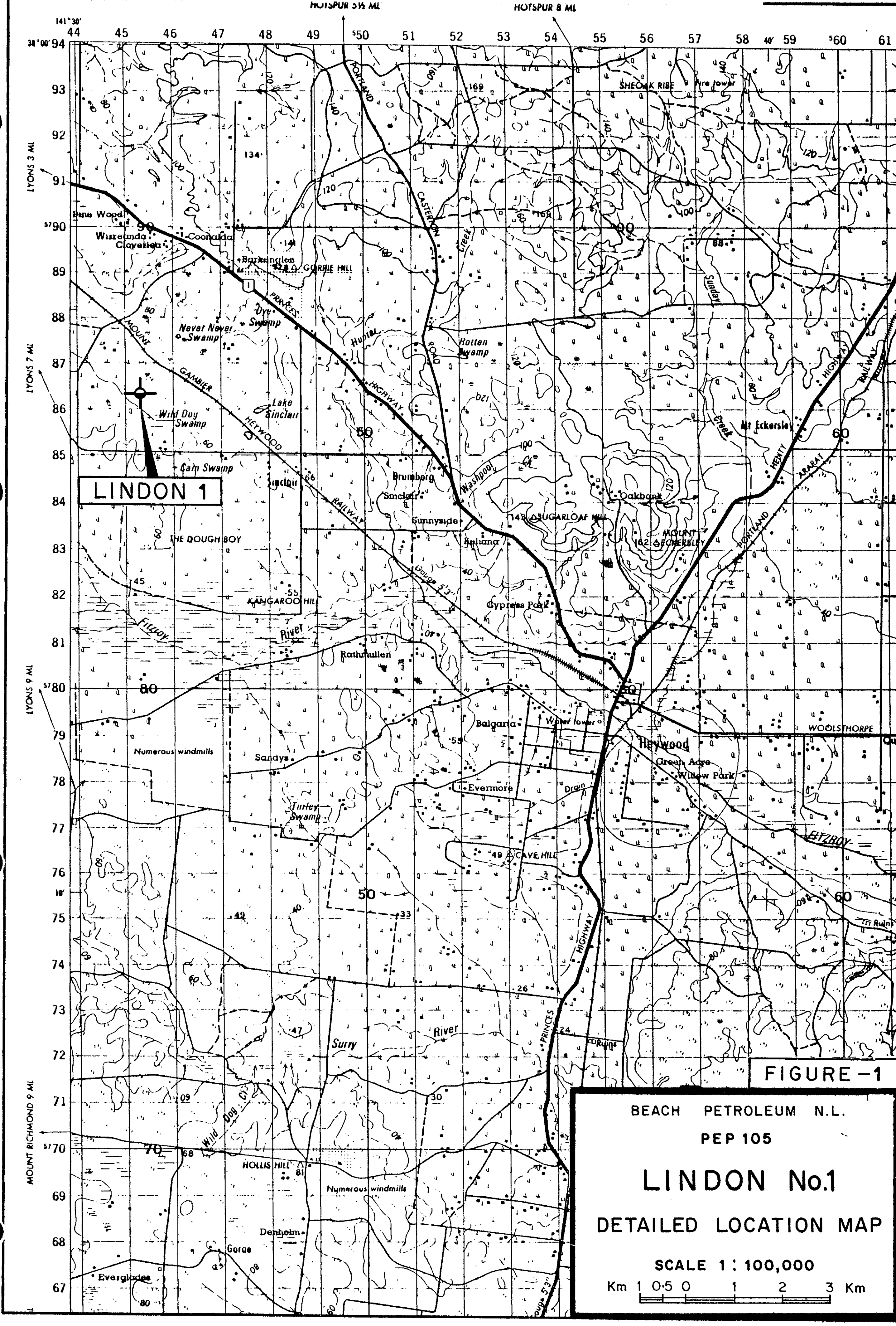


FIGURE – 1

BEACH PETROLEUM N.L.

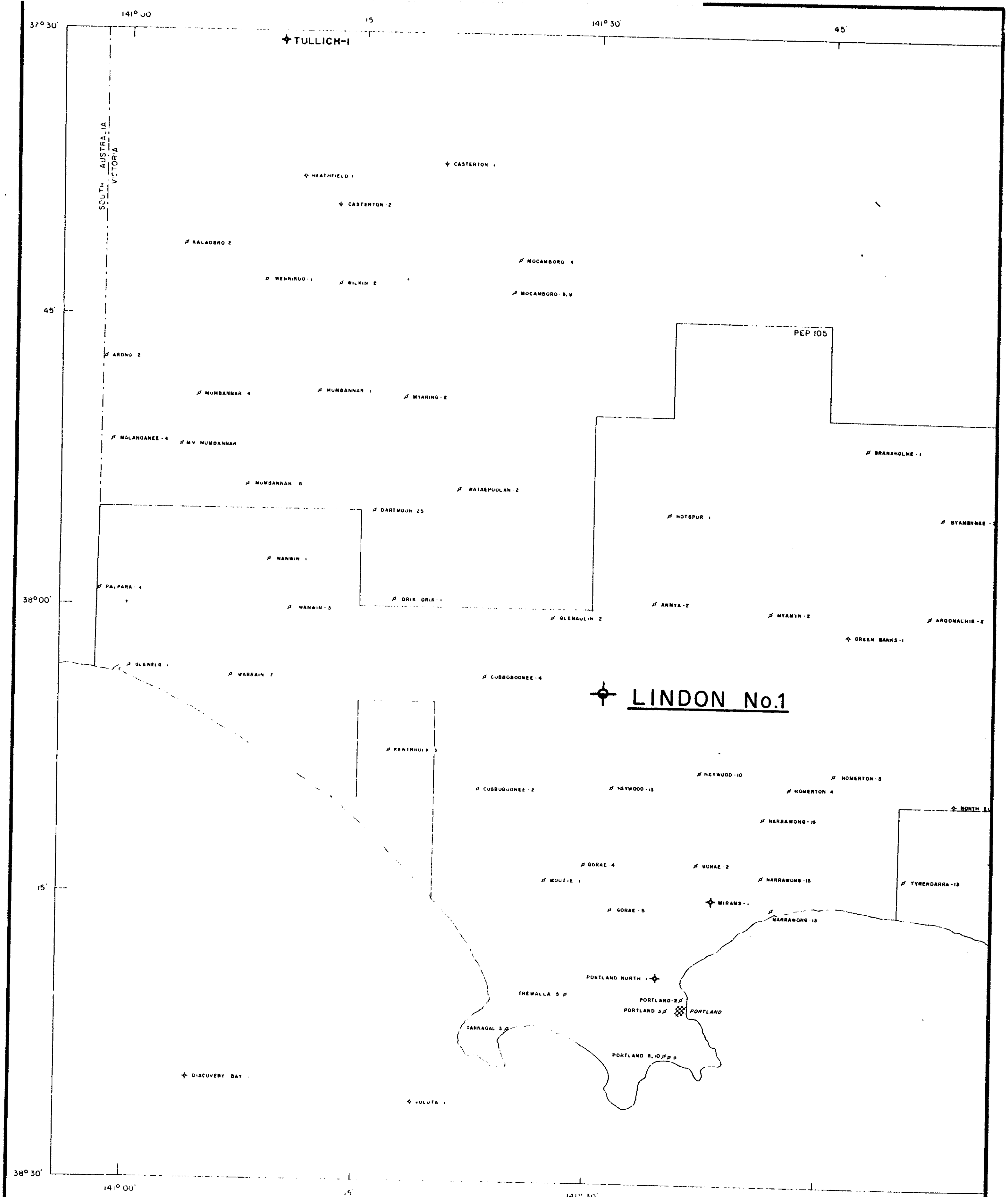
PEP 105

LINDON No.1

DETAILED LOCATION MAP

SCALE 1 : 100,000

Km 1 0.5 0 1 2 3 Km



BEACH PETROLEUM N.L.

LINDON No.1

REGIONAL LOCATION MAP

Scale 1 : 500,000

KM 0 5 10 20 30 KM

FIGURE No. 2

2. WELL HISTORY

2.1. Location (Refer Figure 1)

(i)	Co-Ordinates (Approx.):	38° 04' 05.5" South 141° 30' 54.7" East
(ii)	Geophysical Control:	Shotpoint 532.5 Line D.226 Beach Petroleum N.L. 1983 Denhelm Seismic Survey.
(iii)	Real Property Description:	Parish of Drumborg Shire of Portland County of Normanby
(iv)	Property Owner:	Mr. B.A. Price 'Lindon'
(v)	District:	Portland Sheet 7221 100,000 sheet map.

2.2. General Data (Refer Figure 2)

(i)	Well Name and Number:	Lindon No. 1
(ii)	Tenement:	P.E.P. 105
(iii)	Elevation:	Ground Level:- 63.3 m ASL Kelly Bushing: 69.8 m ASL (All depths referred to K.B.)
(iv)	Total Depth:	Driller: 3011 m Schlumberger 3011 m
(v)	Date Drilling Commenced:	1/12/83 @ 1530 hours
(vi)	Date Total Depth Reached:	1/1/84 @ 2200 hours
(vii)	Date Rig Released:	5/1/84 @ 0600 hour
(viii)	Drilling Time to Total Depth:	32 days
(ix)	Status:	Plugged and Abandoned

2.3. Drilling Data

2.3.1.	Drilling Contractor:	Richter Drilling Pty. Ltd. GPO Box 2197 Brisbane, Qld. 4001. Mercantile Mutual Building 11th Floor, 43 Creek Street Brisbane, Qld. 4000
2.3.2.	Drilling Rig:	National 80 UE Rotary Rig No. 14

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2. WELL HISTORY - Continued

2.3. Drilling Data - Continued

2.3.3. Casing and Cementing

i) Surface Casing

Size	:	13-3/8 inch
Weight	:	48 lb/ft
Grade	:	H40
Range	:	3
Coupling	:	STC
Centraliser	:	At 78 m, 91 m, 100 m
Float Collar	:	At 90 m
Shoe	:	At 102 m
Cement	:	340 Sacks Class A Neat 100 Sacks Class A with 2% $Ca\ Cl_2$ 30 Sacks Class A with 2% $Ca\ Cl_2$
Cemented to	:	Surface
Method:	:	Dual (Top & Bottom) plug displacement
Equipment	:	Halliburton dual skid mounted pump, HT400

Note: Top-filled annulus with 30 sacks Class A and 2% Ca C12.

Intermediate Casing

Size	:	9-5/8"
Weight	:	Top to bottom 1 joint - 40 lb/ft 70 joints - 36 lbs/ft
Grade	:	Top to bottom 1 joint - N80 70 joints - J55
Range	:	3
Coupling	:	STC
Centraliser	:	At 825 m, 839 m, 847 m
Float Collar	:	At 837 m
Shoe	:	851 m
Cement	:	400 Sacks Class A Neat
Cemented to	:	400 m (theoretical)
Method	:	Dual (Top and Bottom) plug displacement.
Equipment	:	Halliburton dual skid mounted pump, HT400.

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. WELL HISTORY - Continued

2.3. Drilling Data - Continued

2.3.3. Casing and Cementing - Continued

ii) Plugs

Plug No. 1

Interval	:	1250 - 1190 m
Cement	:	75 Sacks Class A Neat
Method	:	Balanced
Tested	:	No

Plug No. 2

Interval	:	960 - 830 m
Cement	:	225 Sacks Class A Neat
Method	:	Balanced
Tested	:	Tagged at 830 m to 10,000 lbs weight

Plug No. 3

Interval	:	Surface
Cement	:	20 Sacks
Method	:	Hand mixed
Tested	:	Seen

iii) Conductor

A 20" conductor was set at 11 m (K.B.).

2.3.4. Drilling Fluid

i) 17½" Hole, Surface 106 m

The well was spudded using a fresh water gel mud with a funnel viscosity of 35 sec. The range of properties:-

SG 1.04
Viscosity 35
Water Loss: Not Taken

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WELL HISTORY - Continued

2.3 Drilling Data - Continued

2.3.4 Drilling Fluid

ii) 12¼" Hole, 106 - 850m

The 12¼" hole section was drilled using a lightly treated low solids, non dispersed gel/ Benex /CMC EHV. Minor mud ring problems occurred. Viscosity was maintained through the Dilwyn Formation. Once Pember Mudstone Member was reached, water loss was reduced to less than 15 ccs prior to logging.

The range of properties:-

SG : 1.03 - 1.07

Viscosity : 33 - 47

Water Loss: 24 - 13.4

iii) 8 ½" Hole, 850 - 3011m

The 8½" hole was drilled using a KCI/Polymer mud system. The hole was left open for 27 days. During this time 5 log tools, 3 drill stem tests and 11 new bits were run all without indications of tight hole. The dipmeter caliper confirms that the hole was in gauge nearly the entire section.

SG 1.03 - 1.20

Viscosity 39 - 45

Water Loss: 8.2 - 18

See Appendix 6 for specific details of the drilling fluid recap.

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2. WELL HISTORY - Continued

2.3 Drilling Data - Continued

2.3.5 Water Supply

Drilling water was obtained from a fresh water bore and also a stream supply. Both supply sources were located on the same farm property. Water was delivered using a 3" lay-flat plastic hose.

2.4 Formation Sampling and Testing

2.4.1 Cuttings

Lagged samples of cuttings were collected from the shale shaker at the following intervals:-

Surface	-	10m. Nil
10m	-	500m @ 10m intervals
500m	-	3011m @ 5m intervals

Four splits were made of the washed, oven-dried samples and stored in labelled polythene bags; one for Beach Petroleum NL, one for Gas & Fuel Exploration NL, one for Victorian Department of Minerals and Energy and one spare. One set of unwashed, air-dried samples was taken at 10m intervals in calico bags for micropaleo/palynology/source rock studies.

2.4.2 Cores

i) One conventional core was taken from 912.50m - 916.35m interval.

ii) Thirty sidewall cores were attempted. Twenty-seven were recovered. Three cores remained unrecovered. Following depths are in metres:-

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2. WELL HISTORY - Continued

2.4. Formation Sampling and Testing - Continued

2.4.2. Cores - Continued

30	860.0	15	1850.0	
29	873.0	14	1946.0	
28	906.5	13	1948.4	
27	931.6	12	1959.0	
26	996.0	11	2145.0	
25	1115.0	10	2253.0	
24	1206.8	9	2352.0	NR
23	1216.5	8	2449.0	
22	1223.1	7	2650.0	NR
21	1237.5	6	2752.0	NR
20	1246.0	5	2848.0	
19	1451.0	4	2902.5	
18	1545.0	3	2952.0	
17	1651.1	2	2980.0	
16	1752.0	1	3001.5	

NR - No Recovery

Descriptions and analyses of the cores are enclosed as Appendix No. 7.

2.4.3. Formation Tests

i) Conventional

Drill Stem Test No. 1 (Refer to Appendix No. 7)

Interval Tested	:	890.9 - 912.5 m
Formation Tested	:	Pebble Point
Packet Set at	:	889.1m and 890.9m
Valve Open (1)	:	10 minutes - weak air blow
Final Shut-In	:	240 minutes
Pressures (PSI)	:	Initial Hydrostatic 1355.8
(Bottom gauge at 910.7 m)	:	Initial flow (2) 91.1 Final flow (2) 149.6 Final shut-in (2) 1080.9 Final hydrostatic 1349.1 (BHT = 43.3°C @ 910.44 m)

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2. WELL HISTORY - Continued

2.4. Formation Sampling and Testing - Continued

2.4.3. Formation Tests - Continued

i) Conventional - Continued

Drill Stem Test No. 1 - Continued

Recovery	:	18.2 m (60 ft) heavily oil and gas cut mud, 27.4 m (90 ft) slightly gas cut mud, 18.2 m of mud.
Assessment	:	Although the Pebble Point Formation is tight, the existing porosity is oil saturated with minor gas.

ii) Drill Stem Test No. 2 (Refer Appendix No. 7)

Interval Tested	:	887.5 - 927m
Formation Tested	:	Pebble Point
Packer Set at	:	885.7m and 887.5m
Valve Open (1)	:	10 minutes. Initially a weak air blow which slowly increased to moderate and then stabilized.
Final Shut-in	:	120 minutes
Pressure (PSI)	:	Initial Hydrostatic 1383.4
(Bottom gauge at 926 m)	:	Initial flow (2) 227.9 Final flow (2) 575.5 Final shut-in (2) 1174.5 Final hydrostatic 1378.6 (BHT = 43.3^{o} C @ 925.68 m)
Recovery	:	351 m of muddy water. (13.3 bbls., 4,700 ppm Cl^{-})
Assessment	:	The Pebble Point Formation tested is tight with the very minor porosity below the water zone saturated with relatively fresh water.

iii) Drill Stem Test No. 3 (Refer to Appendix No. 7)

Interval Tested	:	2980 - 3011 m
Formation Tested	:	Crayfish Formation - Geltwood Beach Facies
Packer Set at	:	2977.9m and 2980 m
Valve Open (1)	:	10 minutes - weak air blow
Final Shut-in	:	60 minutes

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2. WELL HISTORY - Continued

2.4. Formation Sampling and Testing - Continued

2.4.3. Formation Tests - Continued

iii) Drill Stem Test No. 3 - Continued

Pressures (PSI)	:	Initial Hydrostatic		5037.0
(Bottom gauge at 3010 m)	:	Initial flow (2)		197.1
		Final flow (2)	unreadable	208.0
		Final shut-in (2)		254.0
		Final hydrostatic (BHT = 115.5^{o}C)		4933.0
Recovery	:	70 m mud		
Assessment	:	The Crayfish Formation tested is extremely tight.		

2.5. Logging and Surveys

2.5.1. Mud Logging

A skid-mounted Exlog unit was used to provide penetration rate, continuous mud gas monitoring, intermittent mud and cuttings gas analyses, pump rate and mud volume data and cuttings descriptions. The Mud Log is in Enclosure No. 1.

2.5.2. Wireline Logging

Schlumberger Seaco Inc. recorded the following logs in open hole and a portion of the Gamma Ray log in cased hole:-

Run 1

Dual Laterolog (DLL-GR-SP-CAL)

DLL-SP-CAL 849 m - 101 m (13-3/8" casing shoe)

GR 849 m - 40 m

Sonic Log (BHC-GR)

849 m - 101 m (13-3/8" casing shoe)

Density-Neutron Log (FDC-CNL-CAL-GR)

1767 m - 850 m

Dipmeter (HDT)

3011 m - 851 m (9-5/8" casing shoe)

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2. WELL HISTORY - Continued

2.5. Logging and Surveys - Continued

2.5.2. Wireline Logging - Continued

Run 2

Dual Laterolog (DLL-GR-SP-MSFL-CAL)

DLL-GR-SP-CAL 1766.5 m - 851 m (9-5/8" casing shoe)

MSFL 1231 m - 851 m (9-5/8" casing shoe)

Sonic Log (BHC-GR)

1765.5 m - 851 m (9-5/8" casing shoe)

Run 3

Dual Laterolog (DLL-GR-SP)

3011 m (T.D.) - 851 m (9-5/8" casing shoe)

Sonic Log (BHC-GR)

2954 m - 1745 m

Run 4

Sonic Log (BHC-GR)

3011 m (T.D.) - 2925 m

These logs are found in Enclosures 3 to 11 inclusive.

2.5.3. Deviation Surveys

The results of deviation surveys using a TOTCO survey instrument were:-

3/4°	@	33 m	3¼°	@	1200 m
1/2°	@	62 m	3°	@	1290 m
1/2°	@	106 m	2°	@	1385 m
0°	@	211 m	1½°	@	1572 m
1/2°	@	305 m	2°	@	1773 m
1°	@	410 m	2°	@	1998 m
3/4°	@	513 m	2¼°	@	2196 m
1°	@	608 m	3°	@	2430 m
1/2°	@	749 m	3½°	@	2619 m
0°	@	850 m	3-3/4°	@	2822 m
2°	@	1048 m	4°	@	2954 m
3°	@	1146 m	3¼°	@	3011 m

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2. WELL HISTORY - Continued

2.5. Logging and Surveys - Continued

2.5.4. Velocity Survey

A velocity survey was carried out by Schlumberger at 18 levels. See Appendix No. 14 and Enclosure 13.

3. RESULTS OF DRILLING

3.1. Formation Tops

The following formation tops have been picked using cuttings descriptions, mudlog and wireline log data (all depths in metres).

* DOES NOT APPEAR TO ALLOW SUFFICIENTLY FOR HOLE DEVIATION TO PROVIDE LOWER TVDSS & TVT

GROUP	FORMATION	K.B.(m)	SUBSEA(m)*	THICKNESS(m)
Heytesbury	Port Campbell	10 (approx.)	+59.8	176+
	Gellibrand	186	-116.2	62
	Clifton	248	-178.2	23
Nirranda	Narrawaturk	271	-201.2	77
	Mepunga	348	-278.2	58.5
Wangerrip	Dilwyn	406.5	-336.7	258.5
	(Pember Mudstone Member)	665	-595.2	245
	Pebble Point	910	-840.2	38.5
Sherbrook	Paaratte	948.5	-878.7	249.5
	Belfast	1198	-1128.2	29
	Waarre	1227	-1157.2	7.5
Otway	Eumeralla	1234.5	-1164.7	1715.5
	Crayfish-Geltwood Beach Facies	2950	-2880.2	61+
	T.D.	3011	-2941.2	

3.2. Lithologic Description

Formation	Lithologic Description
HEYTESBURY GROUP	
Port Campbell Formation	Approx. 10 m - 186 m CALCARENITE, very pale orange to dark yellow orange becoming light to very light grey, firm to hard; dominantly moderately hard, very fine to coarse, dominantly medium grain-size, abundant argillaceous matrix, abundantly fossiliferous; bryozoa, coral, echinoid spines, bivalve and brachiopod fragments, forams, trace clear to light grey; loose, very fine grained quartz, trace glauconite, graded to and interbedded with:-

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3. RESULTS OF DRILLING - Continued

3.2. Lithologic Description - Continued

Formation	Lithologic Description
HEYTESBURY GROUP - Continued	
Port Campbell Formation - Continued	MARL, medium to very light grey, soft to hard, dominantly firm, sticky, dispersive, common fossil fragments; abundant forams becoming common with depth, trace glauconite common very fine quartz and carbonate grains becoming trace with depth.
Gellibrand Formation	186 m - 248 m MARL, light grey to light olive grey, very soft, very sticky, trace forams, trace glauconite.
Clifton Formation	248 m - 271 m CALCARENITE, grey orange to yellowish grey, hard, crystalline, abundant argillaceous matrix, very commonly fossiliferous; coral, forams, bryozoa, echinoid spines, common ferruginous nodules, trace glauconite, with minor:- MARL, pale olive to greenish grey, very soft, very finely fossiliferous, macrofossiliferous fragment.
NIRRANDA-SUB GROUP	
Narrawaturk Formation	271 m - 348 m Dominantly CALCARENITE, very pale orange, hard, crystalline, abundant argillaceous matrix, common calcareous cement, abundantly fossiliferous, limonitic infilling and nodular aggregates with some:-

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3. RESULTS OF DRILLING - Continued

3.2. Lithologic Description - Continued

Formation	Lithologic Description
NIRRANDA-SUB GROUP - Continued	
Narrawaturk Formation - Continued	
	MARL greenish grey, very soft, very finely fossiliferous, trace glauconite, trace limonite nodules.
Mepunga Formation	348 m - 406.5 m Interbedded MARL, greenish grey, very soft, very finely fossiliferous, rare glauconite, trace limonite nodules and CALCARENITE greyish orange, with clear very fine grained, sub-angular to sub-rounded moderately sorted quartz, firm to hard, sucrosic texture, common fine grained glauconite, trace pyrite, occasional fossil fragments.
WANGERRIP GROUP	
Dilwyn Formation	406.5 m - 665 m 406.5-483.5m SANDSTONE clear, frosted, loose, medium to very coarse; dominantly coarse, subangular to subrounded, moderately to poorly sorted quartz, trace pyrite cement, trace calcite cement, trace argillaceous matrix, trace glauconite appears with depth, good visible porosity. No Fluorescence; interbedded with minor:- SILTY CLAYSTONE grading to SILTSTONE brown black, dusky brown, soft, hard in part, dispersive in part, finely micaceous, trace finely carbonaceous, commonly finely arenaceous with depth

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3. RESULTS OF DRILLING - Continued

3.2. Lithologic Description - Continued

Formation	Lithologic Description
WANGERRIP GROUP - Continued	
Dilwyn Formation - Continued	
	483.5-485 m, 504-508.5 m, 510-511.5 m, VOLCANICS greenish black, occasionally mottled, hard, sub-vitreous, cryptocrystalline to finely crystalline, common to abundant mafics, rare to occasionally common white acicular feldspar laths
	511.5-665 m SANDSTONE, very light grey, often clear, loose, medium to granular, dominantly medium becoming coarse with depth, moderately well sorted, subangular to rounded, trace argillaceous and carbonaceous matrix decreasing with depth, trace pyrite cement becoming common with depth, trace mica, trace lithic grains, very good visual porosity. No Fluorescence with minor interbeds of:- CLAYSTONE, brownish black, sticky, dispersive in part, slightly calcareous in part, trace to common very fine carbonaceous material, massive to occasionally sub-fissile and COAL from 605 m black to brownish black, moderately hard, earthy to occasionally subvitreous, massive.
Pember Mudstone Member	665 m - 910 m SILTY CLAYSTONE, brown grey, dark yellow brown, to light olive grey, soft, sticky in part at top, very dispersive, trace to common calcite cement, finely carbonaceous, micaceous, abundant silt size quartz, coarsening to dominantly fine with depth, subangular to subrounded, common fossil fragments inter-bedded with:-

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3. RESULTS OF DRILLING - Continued

3.2. Lithologic Description - Continued

Formation	Lithologic Description
WANGERRIP GROUP - Continued	
Pember Mudstone Member - Continued	
	CLAYEY SILTSTONE, light grey, firm, very argillaceous, subfissile in part, carbonaceous in part.
	Note: Due to the claystone's dispersive quality, misleading high sand fractions are yielded in the shale shaker samples.
Pebble Point Formation	910 m - 948.5 m (See Appendix II) SANDSTONE, medium-dark green grey, friable to firm, very fine to very coarse; dominantly fine and coarse (bimodal); coarse fraction is mainly well-rounded; poorly sorted quartz grains, abundant dark green grey argillaceous matrix/cement, rare calcareous cement, common chlorite? dark grey green pellets, common dark grey green brown chlorite staining on quartz grains, poor porosity decreasing to very poor with depth. The core had 35% patchy (subrounded, pinpoint to 3 cm diameter) irregularly distributed, even moderately bright gold to yellowish orange natural fluorescence giving a rapid streaming bright yellow cut fluorescence with a pale straw natural cut colour. The core had a strong hydrocarbon odour; grading from 938 m to SILTY CLAYSTONE, medium brown, medium green grey, soft, abundant carbonaceous laminae and flecks, trace mica, trace pyrite, trace very fine quartz grains.

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3. RESULTS OF DRILLING - Continued

3.2. Lithologic Description - Continued

Formation	Lithologic Description
SHERBROOK GROUP	
Paaratte Formation	948.5 m - 1198 m 948.5-993 m SANDSTONE, clear to medium grey, loose to friable, hard in part, fine to coarse, dominantly medium, subangular to subrounded, dominantly subrounded, moderately sorted quartz grains, common medium dark brown lithics, trace pyrite cement, moderate to good visual porosity interbedded with:- SILTY CLAYSTONE, medium grey, massive, soft, to firm, fine carbonaceous detritus, trace coal, trace calcite, very finely micaceous 993-1090m SANDSTONE clear to light grey, friable to loose, very fine to fine becoming medium with depth, subangular to subrounded, dominantly subangular, moderately sorted quartz grains abundant brown grey silt/clay matrix, common brown lithics, very rare glauconite, very rare bryozoa, trace pyrite, trace carbonaceous material, poor visual porosity interbedded with:- CLAYSTONE, medium brown, medium grey to very dark grey, dark greyish green, medium grey brown, soft to firm in part, subfissile in part, silt size fraction increases with depth, commonly finely carbonaceous, finely micaceous, trace glauconite, common Coal, subvitreous, conchoidal. 1090-1198 m SANDSTONE, clear to light grey becomes pale greenish grey with depth, loose to friable, hard in part, silt size to very coarse, dominantly medium to coarse, sub-angular to sub-rounded, moderately sorted quartz grains, trace argillaceous matrix,

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3. RESULTS OF DRILLING - Continued

3.2. Lithologic Description - Continued

Formation	Lithologic Description
SHERBROOK GROUP - Continued	
Paaratte Formation - Continued	
	trace limonite pellets, trace iron staining on quartz grains, fair visual porosity interbedded:- SILTY CLAYSTONE, light to medium grey, medium brownish grey, soft to firm, sticky, dispersive finely carbonaceous, finely micaceous in part, common to abundant argillaceous matrix, common very finely arenaceous, trace glauconite.
Belfast Member	1198 m - 1227 m SILTY CLAYSTONE, dark grey, soft, dispersive, massive, subfissile, micromicaceous, moderate to very carbonaceous, occasionally very finely arenaceous, rare glauconite and pyrite.
Waarre Formation	1227 m - 1234.5 m SANDSTONE clear to off white to pale greenish grey, very pale yellow in part, very fine to coarse, dominantly fine, subrounded, poorly sorted quartz, moderate clay matrix, minor silica cement, trace lithics, trace carbonaceous matter, trace chlorite staining, trace pyrite. Poor visual porosity. From 1230.5-1234m hard with abundant calcite cement.

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3. RESULTS OF DRILLING - Continued

3.2. Lithologic Description - Continued

Formation	Lithologic Description
SHERBROOK GROUP - Continued	
Eumeralla Formation	1234.5 m - 2950 m 1234.5-approx. 2400 m SILTY CLAYSTONE, light to medium greenish grey, light to medium bluish grey, light brownish grey in part, soft to firm, dispersive in part, sticky in part with depth, slightly calcareous in part with depth, multicoloured lithics, arenaceous in part, trace fine mica flakes, common clay minerals, trace carbonaceous detritus, trace disseminated pyrite, interbedded, interlaminated and grading to SANDSTONE, light-medium greenish grey, light to medium brownish grey, friable to firm, hard in part very fine to fine, dominantly fine, subangular to subrounded, dominantly subangular, moderately sorted quartz light grey clay matrix, common to trace calcite; pyrite and in part, siliceous cements, rare thin beds of strongly cemented sands, trace to common multicoloured lithics. No visible porosity to occasionally very poor visual porosity and very minor COAL, black, soft to hard, occasionally brittle, earthy to subvitreous, conchoidal fracture in part, very argillaceous in part, often pyritic and very finely arenaceous. from 2050 m COALS, dark brown black to black, hard, brittle, argillaceous in part, silty in part, subfissile in part, blocky in part, subconchoidal fracture, platy in part, subvitreous lustre.

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3. RESULTS OF DRILLING - Continued

3.2. Lithologic Description - Continued

Formation	Lithologic Description

SHERBROOK GROUP - Continued

Eumeralla Formation - Continued

Approx. 2400-2950 m SANDSTONES, becoming white to light grey, light brown grey, light to medium green grey, moderately hard to hard, friable, occasionally brittle, very fine to fine grained subangular to subrounded, poor to well sorted dominantly moderate, trace to common argillaceous matrix becoming common with depth, rare to common calcite cement, trace dolomite cement, trace altered feldspars, trace to common lithic grains, trace carbonaceous detritus, trace micromicaceous, trace quartz overgrowths, trace calcareous laminae. Nil to very poor visible porosity. The sandstones from approx. 2400 m have trace to common, pinpoint to patchy, dull to occasionally bright, gold natural fluorescence giving a very weak to weak streaming, weak-becoming stronger with depth-milky cut to crush cut fluorescence. The coal has no natural fluorescence but gives a moderate slow streaming milky-white cut fluorescence; interbedded and interlaminated with SILTY CLAYSTONE grading to SILTSTONE, green grey, light olive grey, brownish grey, very soft to hard; dominantly firm, very dispersive in part, finely micaceous, finely arenaceous, finely carbonaceous laminae and flecks, non to commonly calcareous in part, sub-fissile in part and minor SHALE, medium

.../ 21

3. RESULTS OF DRILLING - Continued

3.2. Lithologic Description - Continued

Formation	Lithologic Description
SHERBROOK GROUP - Continued	
Eumeralla Formation - Continued	
	dark grey, hard, finely micaceous, fissile with depth, trace pyrite and CARBONACEOUS SHALE, brown black, soft, earthy and COAL, black, firm to brittle, subconchoidal to blocky, subvitreous to earthy, dominantly subvitreous.
Crayfish Formation	2950 m - 3011 m (T.D.)
	2950-2964 m SILTSTONE, light olive grey, medium grey, light greenish grey, pale blue green, firm, abundantly argillaceous, rare garnet medium pink, fine grained, grading to CLAYSTONE, very finely arenaceous in part, microcarbonaceous laminae.
	2964-2974 m. SANDSTONE, very light grey to light grey, firm, very fine to fine grain, moderately sorted, subangular to subrounded quartz, common calcite cement in part, common siliceous cement, occasional fine mica flakes, trace altered felspar, trace carbonaceous flecks, minor lithics. No visible porosity. Approximately 80% patchy very dull blue green mineral fluorescence. No cut or crush cut.
	2974-2981 m. SILTSTONE, medium grey, light olive grey, light greenish grey, pale blue green, firm, abundantly argillaceous micro-carbonaceous laminae.
	2981-2997 m SANDSTONE, very light grey, light greenish grey, very fine to fine, dominantly fine grained, moderately sorted quartz,

.../22

3. RESULTS OF DRILLING - Continued

3.2. Lithologic Description - Continued

Formation	Lithologic Description
SHERBROOK GROUP - Continued	
Crayfish Formation - Continued	
	trace calcite cement, abundant white argillaceous matrix, trace chlorite, trace carbonaceous detritus, trace mica flakes, nil to trace visible porosity. Trace moderate bright pinpoint to patchy, white natural fluorescence giving a weak crush to moderate streaming, moderate bright blue white cut fluorescence.
	2997-3011 m (T.D.) Dominantly SILTSTONE, medium dark brown, light to medium grey, hard, sub-fissile, carbonaceous detritus, argillaceous in part, very finely arenaceous.

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4. GEOLOGY -

4.1. Stratigraphy

The drilling of Lindon No. 1 made several contributions to the stratigraphy of a very sparsely drilled district. See also Figures 3 and 4.

1. Dilwyn Formation occurs deeper and thinner in the section. Three separate volcanic units within the Dilwyn Formation would have contributed to misleadingly fast seismic velocities thereby lifting the interpreted top of the Dilwyn Formation.

2. The hard laterite sandstone, characteristic of the Pebble Point Formation in other wells in the region, was not evident at Lindon No. 1. The absence of this cap suggests that the well was located on a palaeo-topographic high over which deposition of the transported "bottom slope" type of laterites could not develop.

3. The Timboon Sand Member with its typically high porosity was noted even though it has not been previously recognised in V.D.M.E. water bores.

4. Both the Belfast Mudstone Member seal and the secondary objective of the Waarre Formation were significantly thinner than prognosed. The previously unencountered hard basal caliche unit of what is currently termed as part of the Waarre Formation is regarded as a post Otway Group post-depositional feature that infilled local paleotopographic lows.

5. A seismic reflector package believed, prior to drilling, to mark the top of the Crayfish Formation was subsequently confirmed as intra-formational seismic events within the Eumeralla Formation associated with a series of coals.

Stratigraphy of the Otway Basin

Douglas and Ferguson

LINDON No.1

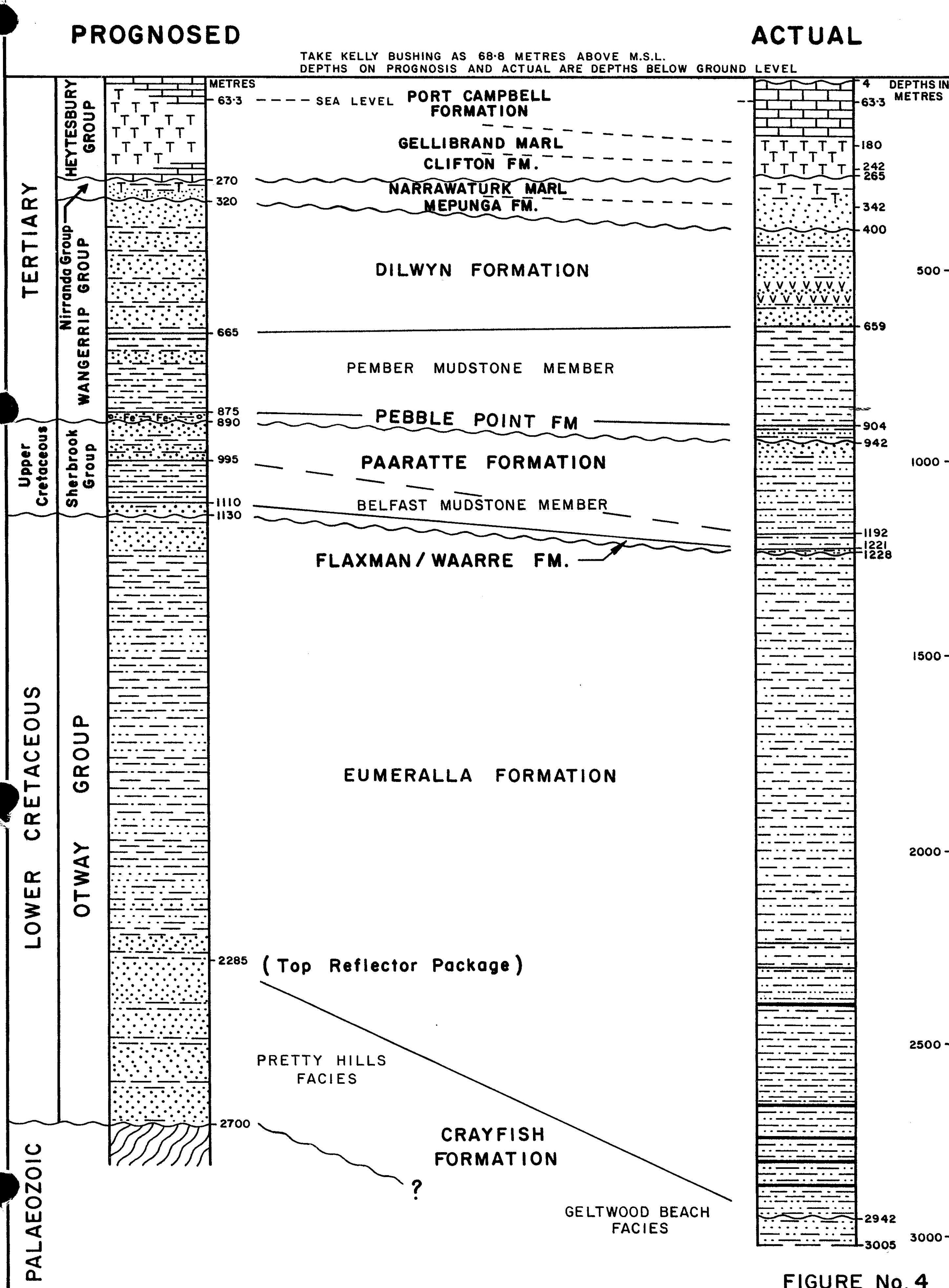
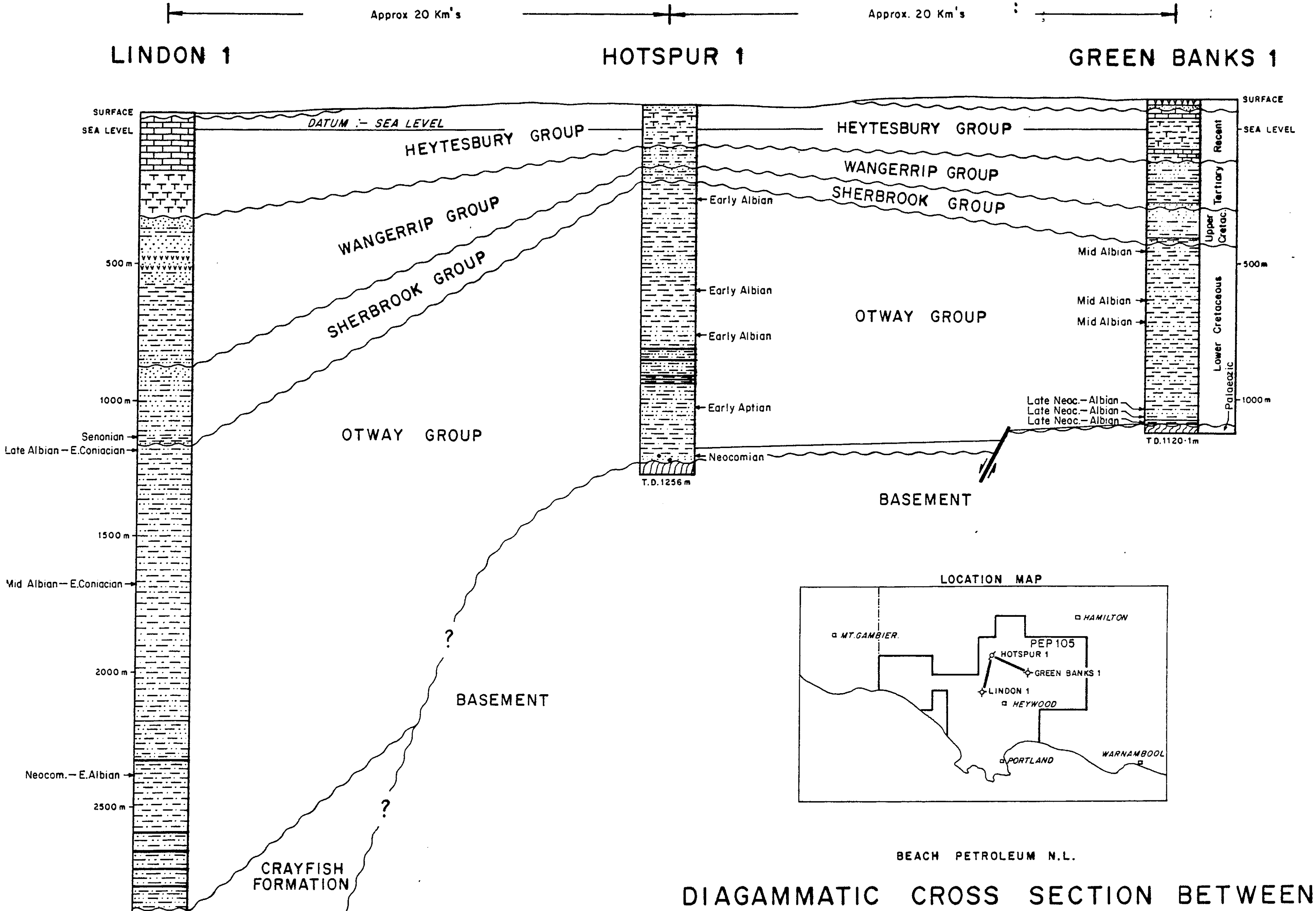


FIGURE No. 4

DRG No. 3173 (f)



BEACH PETROLEUM N.L.

DIAGAMMATIC CROSS SECTION BETWEEN LINDON 1, HOTSPUR 1 AND GREEN BANKS 1

FIGURE No.3

DR... OT.3154

4. GEOLOGY - Continued

4.1. Stratigraphy - Continued

6. The tight and low porosity Geltwood Beach Sandstone Facies of the Lower Cretaceous Crayfish Formation underlie the Eumeralla Formation.

4.1.1. Palynology Studies (See Appendix 10) show that:-

(a) Sidewall cores taken in the restricted marine Belfast Mudstone Member are confirmed as mid Upper Cretaceous in age.

(b) Although yield in palynomorphs was poor in quality and quantity, a biostratigraphic zone range was defined. The older end of the range confirms that SWC No. 21 taken at 1237.5 m belongs to the upper limits of the Lower Cretaceous Eumeralla Formation. (See Figure 3)

(c) A brackish influence on the depositional conditions of the Eumeralla Formation increased with time.

(d) Age was indeterminable on the underlying Crayfish Formation due to barren sidewall core and cuttings samples.

4.2. Structure

4.2.1. Seismic Quality

The Lindon Prospect was defined by 4 seismic lines of the 1983 Denhelm Seismic (acquired by Beach Petroleum NL) and 2 reprocessed seismic lines of 1972 Shell Survey.

Seismic data quality of the Denhelm Survey is excellent at the Near Top Upper Cretaceous level, fair to quite good at Near Base Upper Cretaceous level. Data quality of the 1972 Shell lines was noticeably improved by reprocessing. The Lindon No. 1 well was located on the Denhelm Line D226 at Shot Point 532.5 (See Figure 5).

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LINDON No.1 LOCATION ON SEISMIC LINE

Seismic Line No. D226. Shotpoint No. 532·5

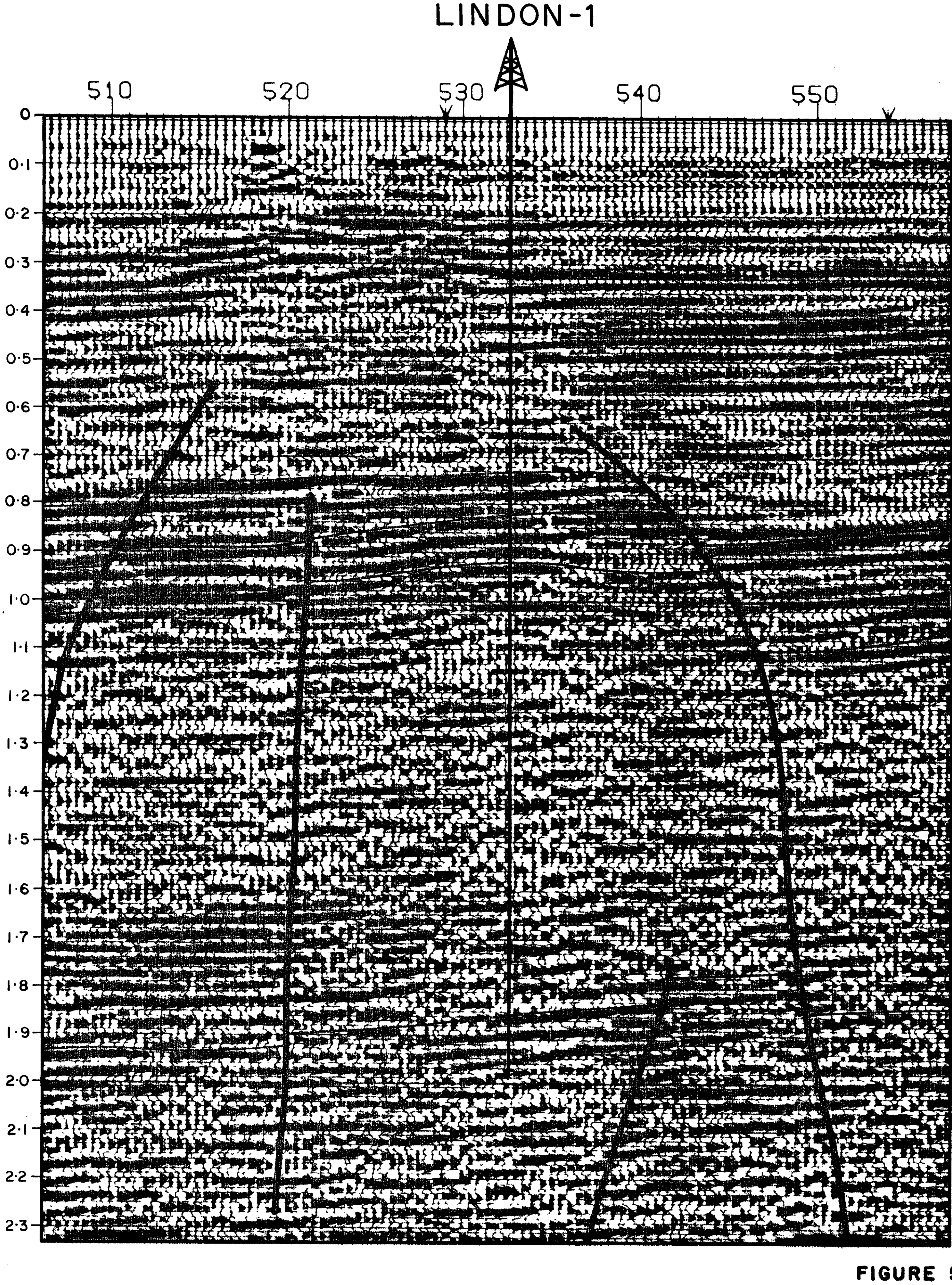


FIGURE 5

BEACH PETROLEUM N.L.

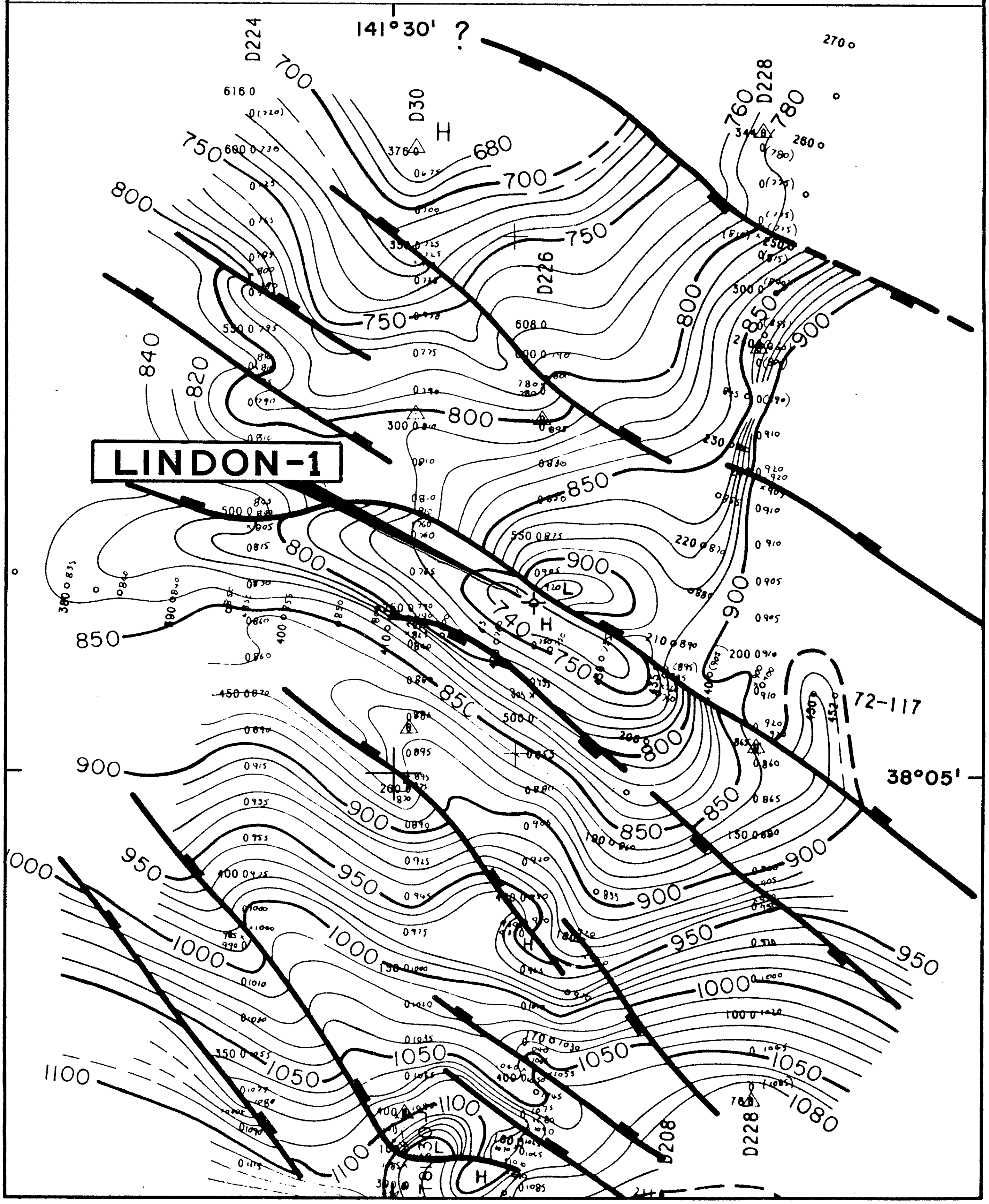
TIME DEPTH STRUCTURE MAP FOR NEAR TOP UPPER CRETACEOUS

Contour Interval :– 10 Msecs

Scale 1 : 25,000

KM 0 0·25 0·5 1·0 1·5 KM

FIGURE No. 6



4. GEOLOGY - Continued

4.2. Structure - Continued

4.2.2. Type and Age of Structure

The Lindon Prospect was mapped as a closed elongate structure at Near Top Upper Cretaceous level (See Figure 6) with its structural axis trending northwest to southeast. It is essentially a horst-block type structure which shows very limited if any rollover into the north bounding fault. The maximum area of closure at the Near Top Cretaceous is estimated to be 3.4 km^2 with maximum vertical relief of 97 metres at the well location.

The Pember Mudstone Member and the Sherbrook Group had been interpreted as thickening on the downthrown side of the northern fault (See Figure 6). Fault movement and its resultant structural development therefore occurred during the Upper Cretaceous and reached completion during the deposition of the near-basal Tertiary Pember Mudstone Member. The thickness of the Member (245 metres) ensured that adequate seal against the Pebble Point Formation was provided. The maximum interpreted throw on the northern fault was 129 metres.

The well was located on the highest position of the Pebble Point Formation on the seismic line D226. Dipmeter results suggest however that the structural crest lies to the north-east of the well location.

The feature was also mapped at Near Base Upper Cretaceous level as a closed structure. It was believed to be similar to the Near Top Upper Cretaceous structure in shape and appeared to have turnover into the northern fault. However, it is unlikely that the Belfast with an actual thickness of 29 m provided adequate seal against the northern fault. Velocity data also indicates a substantially reduced vertical closure at this level.

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4. GEOLOGY - Continued

4.2. Structure - Continued

4.2.2. Type and Age of Structure - Continued

Based on the seismic interpretation, a closed structure was also mapped at the level which was through to be Near Base Lower Cretaceous. The Crayfish Formation was penetrated much deeper than prognosed and it is believed the well was not located over a structure at this level.

4.2.3. Seismic Reflectors

The prognosed tops for the Heytesbury, Nirranda and Wangerrip Group concurred closely with those depths actually encountered.

Although the synthetic seismogram (See Enclosure 11), shows that the Pebble Point Formation is a trough within a strong peak-trough-peak system one cycle below the mapped event the form of the structure remains the same.

The mapped horizon "Near Base Upper Cretaceous" was interpreted 64 millisecs or 119 metres higher than the top Otway Group was encountered. As a result the Paaratte, Waarre and Eumeralla Formations were intersected somewhat deeper than prognosed. Velocity effects caused by 7 metre nett thickness, medium grained, intrusive dolerite bands in the Dilwyn Formation may have contributed by a very limited decrease in the expected seismic reflection times to the top of the Eumeralla Formation and the Sherbrook Group.

Remapping of the Top Otway Group horizon would confirm the aerial extent and closure of the structure at this revised level.

4. GEOLOGY - Continued

4.2. Structure - Continued

4.2.3. Seismic Reflectors - Continued

The Crayfish Formation Top, at 2950 m, was encountered 658 m lower than prognosed. Mappability of this horizon ranged from fair to poor.

The top of a strong reflector package at Lindon-1 was previously believed to represent the top of the Pretty Hills Formation. Drilling confirmed that the strong seismic reflections are the result of a series of coals, within the lower Eumeralla Formation.

Correlation with the synthetic seismogram locates the Crayfish Formation at the base of the coal associated seismic reflector package.

4.2.4. Dipmeter Interpretation

850 - 910 m

Pember Mudstone Member:-

Consists of 2^{o} SW structural dips. Out of gauge borehole and irregular mud cake thickness were probably responsible for the lack of data at the base of the member. However, the south-westerly structural dip is evidence that the well penetrated the structure downdip.

910 - 948 m

Pebble Point Formation:-

There is no dip data to suggest the presence of an unconformity at the top of the formation. The random dip patterns reflect their sedimentary nature. The azimuth of the low dip angles at the base of the formation indicates a south west structural dip.

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4. GEOLOGY - Continued

4.2. Structure - Continued

4.2.4. Dipmeter Interpretation - Continued

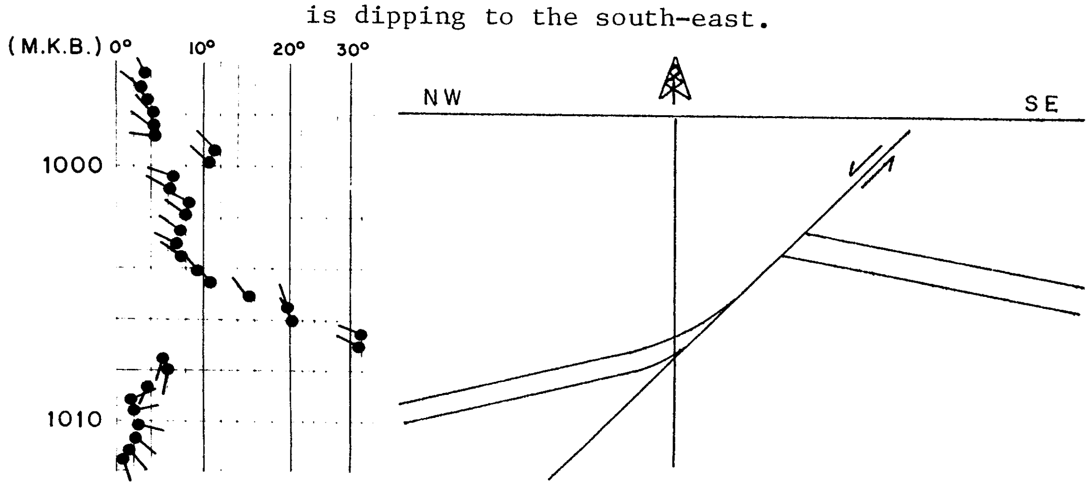
948 - 1198 m

Paaratte Formation:-

Although the dipmeter indicates a more pronounced steepening in dip at 951.0 m, the top Upper Cretaceous unconformity has been placed at 948.0 m. The distinct change in trend of sonic velocities combined with both a steepening in dip from ½° to 1° and an azimuth change from the southwest to the west support this placement. The small red and blue patterns reflect the likely distributary channel systems in the deltaic facies of the Paaratte Formation.

at 1007 m

The borehole appears to intersect the face of a small northwest dipping fault plane with a NE-SW strike. The red pattern shows drag and a NW dip in the downthrown block. The blue pattern shows that the upthrown block is dipping to the south-east.



The feature may also depict a NW-SE elongate channel sand. However, the unimodal azimuth frequency and the gamma ray character fail to confirm the feature as sedimentary in origin.

.../29

4. GEOLOGY - Continued

4.2. Structure - Continued

4.2.4. Dipmeter Interpretation - Continued

1198 - 1227 m

Belfast Mudstone Member:-

Dip record in this Member is characteristically sparse, the typical result of a out-of-gauge borehole condition. Bioturbation may also have contributed to poor dip records by the destructive action of organisms on bedding planes.

1227 - 1234 m

Waarre Formation:-

Consistent dip patterns are absent. High magnitude dips indicate a sedimentary character. Development of the caliche zone (1230.5 - 1234 m) suggests that a transitional period of minimal sedimentation existed between the end of the Lower Cretaceous Otway Group accumulation and the time that the topmost alluvial sandstones of the Waarre Formation were laid down. Caliche zones can be encountered in inter-channel areas that lie beyond river influence. The calcrete represents an initial limited deposition of fine grained flood plain/overbank sediments followed by a period in which the rate of sedimentation was sufficiently slow to allow sub-aerial soil horizon development. As a result, conditions were established for the secondary precipitation of calcium carbonate at depth.

1234 - 2950 m

Eumeralla Formation:-

The top Otway Group Unconformity was interpreted at 1234 m because;

(a) a distinct gamma ray log character change occurs at this level.

(b) the fine grained well cemented sandstones of the caliche, currently included in the Waarre Formation, is seen as a post Otway Group feature.

.../30

4. GEOLOGY - Continued

4.2. Structure - Continued

4.2.4. Dipmeter Interpretation - Continued

Eumeralla Formation - Continued

(c) a small blue pattern occurs below 1234 m shows decreasing dip and an azimuth change. Structural dip increased with depth from 2° to 10° with a very pronounced south-westerly azimuth.

2950 - 3001 m, T.D.

Crayfish Formation:-

The long green pattern commencing at approximately 2950 m shows that the regional dip of 8 - 10° dominates to the west. Indications in the wireline logs of an unconformity between the Geltwood and Eumeralla Formations are inconclusive.

4.3. Porosity/Water Salinity/Saturations

4.3.1. Pebble Point Formation

(i) Porosity

Log data confirms that the core was cut over the zone of optimum relative porosity. Determinations of porosity were made on Core No. 1 using a number of methods:-

(a) SFM - Summation of Fluids Method using whole core sections.
(b) WCA - Whole Core Analysis.
(c) Plug analysis under both atmospheric and overburden pressure conditions.

It was found that respective porosity determinations varied depending on the method employed. Comparisons indicate that the computer processed wireline log interpretation is in best agreement with the SFM results for whole core sections. (See Table 2.)

SUMMARY OF POROSITY/PERMEABILITY DETERMINATIONS

OF PEBBLE POINT FORMATION - CORE NO. 1

CORRECTED DEPTH	S.F.M. Ø	S.F.M. K	W.C.A. Ø K (MD)	PLUG ANALYSIS NO	PLUG ANALYSIS ATMOS Ø	PLUG ANALYSIS PRESS K(md)	PLUG ANALYSIS OVERBURDEN PRESS Ø	GLOBAL INTERPRETATION Ø	SAMPLE POINT COUNT Ø.	% DIFF CORE Ø / LOG Ø
915.12				1	5.5	0.02		10.5		- 47%
915.14				2	21.7	424		11		+ 97%
915.88-915.94	12.1							10.2		- 18%
915.98				3	19.5			10	9.2	+ 95%
916.2 - 916.37			23 Vert. 12 Horiz. 68					10.8		+112%
916.43				4	19.2	72		12		+ 60%
916.48-916.55	12.0							12.2		- 2%
916.59				5	27.7	790		12.4	8.4	+123%
916.9				6	22.4	254	1200 psi @ 19.6	11.5		+ 94%
917.25				7	26.5	1135		13.5	3.0	+ 96%
917.64-917.72	15.8							16		- 18%
917.98				8	28.2	904		13		+116%
918.15				9	24.3	231	1200 psi 22.5	13		+ 86%
918.32				10	13.2	639		12.8		+ 3%
918.35-918.4	6.4							12.5		- 8%

NOTE:- 1. Drilling, Coring, Mud Log depths require a correction of +2.5 m to match depths with Wireline Logs over Pebble Point Formation.

2. SFM - Values were determined by the Summation of Fluids Method.

3. WCA - Values were determined by Whole Core Analysis.

TABLE 2.

4. GEOLOGY - Continued

4.3. Porosity/Water Salinity/Saturations - Continued

4.3.1. Pebble Point Formation - Continued

(i) Porosity - Continued

The reason for 8 of the 10 plugs analyzed and the one WCA - (porosities to be on average 97% higher than the log derived porosities) is not attributable to any one factor. However, the following events, either in combination or alone may have led to over-estimated porosity:-

(a) A plug sampling procedure in which, although representative sampling was intended, sections of higher porosity were selected.

(b) The dehydration of bound water from the smectites in the clay matrix allowing increased injections of helium volumes.

DST-2 results confirm that the cored section has very low permeability and therefore assumed low porosity. Core petrology studies note the presence of smectite clays in which the ready dehydration of water molecules results in the creation of artificial porosity. Therefore methods of porosity determination which are affected to differing degrees by the relative absorption/dehydration of water are not compatible. It is significant that the Summation of Fluids Method which limits sample heating during preparation (by monitoring weight loss due to dehydration of bound water) provides lower porosity results.
See Appendix 11 for an estimate of the additional artificial porosity. The current Global Log Interpretation, processed on 1/3/84, tends to support lower porosities. An amended Global Log Interpretation will be available at a later date. Therefore, the Summation of Fluids Method and the Global Log Interpretation method would appear to provide the more reliable porosity determinations.

4. GEOLOGY - Continued

4.3. Porosity/Water Salinity/Saturations - Continued

4.3.1. Pebble Point Formation - Continued

(i) Porosity - Continued

The vertical closure of the fault controlled structure is 97 metres with a nett pay thickness of 78 metres. If the vertical porosity trends have lateral continuity, the equivalent high porosity water-filled section at Lindon-1 could be oil-filled updip.

The cored section represents the zone of highest porosity sands. The second drill stem test recovered only water. This suggests that the location of the oil-water contact occurs at 917.5 m. Therefore the well penetrated an oil column of approximately 7.5 metres. (See Figures 7 and 9.)

Note: A correction factor of + 2.5 m needs to be added to mudlog, core and test depths when correlating with wireline log data over the Pebble Point Formation because:-

(a) The drilling break reported at 908.5 m is evident on wireline logs at 911 m on the density/neutron, the gamma ray and the sonic curves. (See Figure 7.)

(b) The core top that was cut at driller's depth of 912.5 m is marked by a very hard, nil to very poorly porous clayey sandstone which coincides with the:-

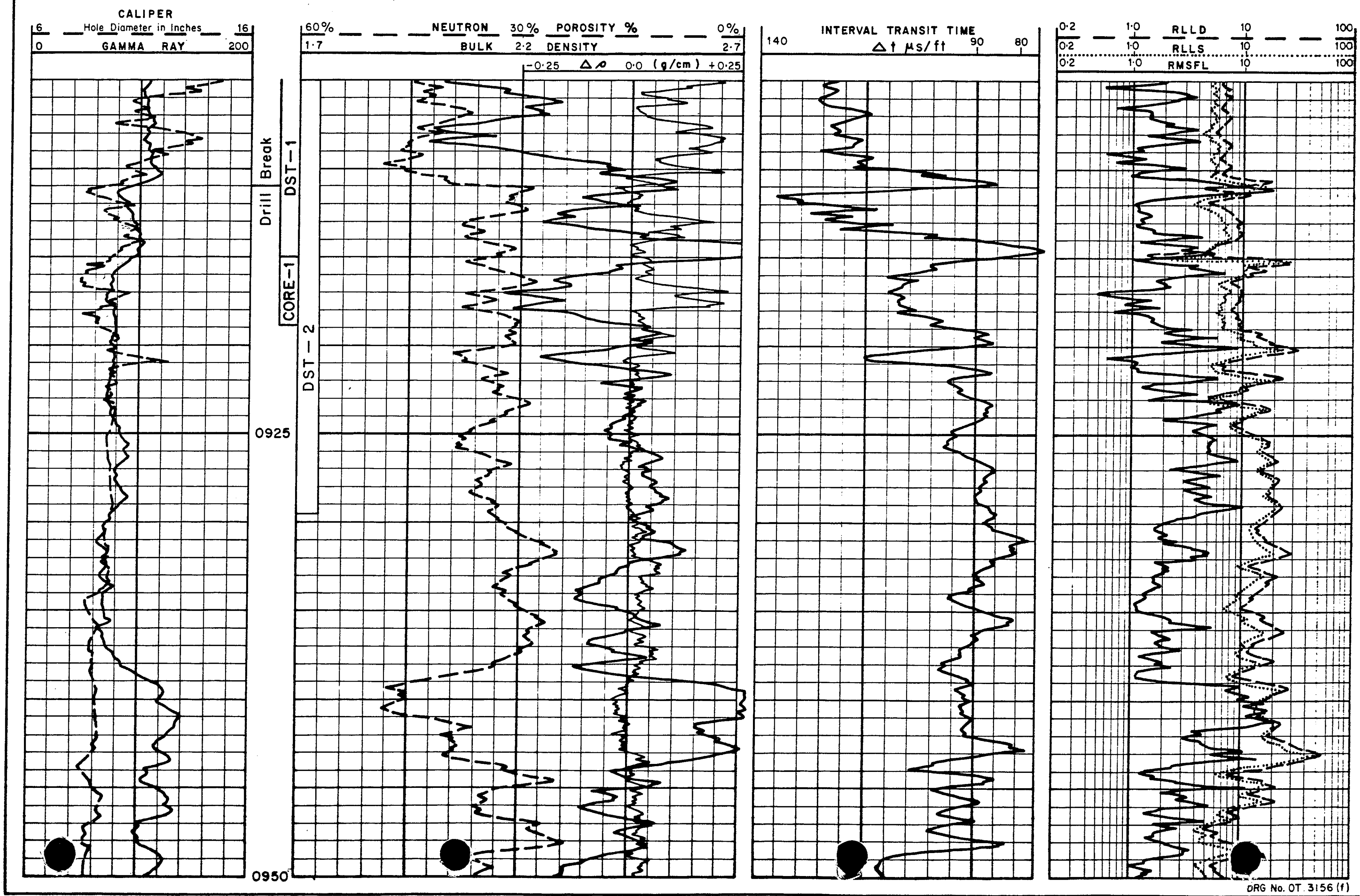
neutron porosity log decrease
density log increase
sonic porosity decrease, all at a depth of 915.0 m.

See Figure 7.

FIGURE 7

BEACH PETROLEUM N.L.

LOG, CORE AND TEST DEPTH MATCH OVER PEBBLE POINT FORMATION



DRG No. OT 3156 (f)
BASE MAP M.32

4. GEOLOGY - Continued

4.3. Porosity/Water Salinity/Saturations - Continued

4.3.1. Pebble Point Formation - Continued

(i) Porosity - Continued

(c) The depth (approx. 917.25 - 917.98 m) of the maximum log interpreted porosity in the core must conform with the corrected depth of the maximum porosity as determined by core analysis. (See Table 2.)

(ii) Water Salinity

There are two sources from which to derive an Rw using the muddy water sample recovered in DST No. 2:-

			PPM Cl^-
DIRECTLY MEASURED R			
1.	Lindon DST-2 888 - 927 m bottom sample	$R_{DST} = 0.869\,\Omega - m$ @ $20.5^{o}C$	6,200
2.	Mud Filtrate	$R_{mf} = 0.31\,\Omega - m$ @ $80^{o}F$	19,500
3.	Formation Water	$R_{wa} = 1.0\,\Omega - m$ @ $80^{o}F$ (Surface Temperature) $= 0.75\,\Omega - m$ @ $43.3^{o}F$ (Fm. Temperature)	5,250

4. GEOLOGY - Continued

4.3. Porosity/Water Salinity/Saturations - Continued

4.3.1. Pebble Point Formation - Continued

(ii) Water Salinity - Continued

SALINITY BY TITRATION

			PPM Cl^-
1.	Lindon DST-2 bottom sample	Salinity =	4,700
2.	Mud Filtrate	Salinity =	23,000
3.	Formation Water		
	R_{wa} = 1.6 Ω - m @ 80°F (Surface Temp)		3,392
	= 1.2 Ω - m @ 43.3°F (Fm. Temp)		

These determinations of Rw have been corrected for drilling mud contamination of the DST sample. The dilution factor on the mud was 14:1 to obtain the DST sample. The range of Rw (Pebble Point Formation) is:-

0.75 - 1.2 Ω - m @ Formation Temperature (43.3°C)
Salinity range is 3300 - 5600 ppm Cl^-.

(iii) Saturations - Oil

Oil saturation determinations were carried out on four sections of whole core using the summation of Fluids Method (See Appendix No. 4):-

1. So = 1.7 % @ 915.88 - 915.94 m
2. So = 4.2 % @ 916.48 - 917.72 m
3. So = 10.1% @ 917.64 - 917.72 m
4. So = 1.0% @ 918.35 - 918.40 m

The current wireline log interpretation does not record the presence of oil as verified by DST 1 and Core No. 1.

.../35

4. GEOLOGY - Continued

4.3. Porosity/Water Salinity/Saturations - Continued

4.3.1. Pebble Point Formation - Continued

(iv) Saturations - Water

Wireline logs and lack of fluorescence in cuttings samples suggest the oil water contact zone occurs approximately 919 - 921 m.

Water saturation determinations using the Summation of Fluids Method on four whole core sections as above show that:-

1. Sw = 76.5%
2. Sw = 71.7%
3. Sw = 70.9%
4. Sw = 85.6%

Revised water saturation values will be available pending rerunning of the GLOBAL log interpretation.

4.3.2. Waarre Formation

(i) Porosity

Porosity determinations by wireline log interpretations are summarized on Appendix 15. The range of porosity values of the upper zone of the Waarre Formation is 31 - 39% using a compaction factor of 1.10.

(ii) Water Salinity

Using i) Hingle (Ø vs R) Crossplot
ii) Rwa = Rt/F
iii) Rw/Rmf Ratio Overlay Technique.

The average value for Rw = 0.34 Ω- m @ Formation Temperature (124°F).
Salinity = 11,900 ppm Cl^-.

4. GEOLOGY - Continued

4.3. Porosity/Water Salinity/Saturations - Continued

4.3.2. Waarre Formation - Continued

(iii) Saturation

Water saturation of the porous upper Waarre Formation is very high with interpreted Sw range 90 - 100%. (See Appendix 15.)

4.3.4. Crayfish Formation

(i) Porosity

Cuttings samples indicate that there is an abundance of dispersed white clay matrix present. Visual porosity was nil to trace. Some intergranular porosity was seen in the samples as pinpoint sized holes in the clay matrix.

Log interpretation indicates higher porosities exist (Appendix 15). However, the low gamma ray response over this shaley sandstone suggests the matrix is the potassium deficient clay. In short, visual evidence of an abundant clay matrix combined with log indications of a potassium deficient clay suggest that porosity is very poor.

Therefore shale determinations using the gamma ray indicator are undervalued which tend to falsely increase porosity determinations. Further porosity computations using the dispersed clay model or crossplots require an input of density/neutron log data which are not available across this section.

(ii) Water Salinity

Salinity of formation water was calculated using the SP log, to be 25,000 ppm CI^-. Suppression of the SP deflection through shale effect suggests that this figure is underestimated.

4. GEOLOGY - Continued

4.3. Porosity/Water Salinity/Saturations - Continued

4.3.4. Crayfish Formation - Continued

(iii) Saturations

Water saturation computations are recorded in Appendix 15. Some hydrocarbon saturation over the 2980 - 3000 m interval appears evident using cutting fluorescence and log interpretation. However reliable log-interpreted water saturations of shaley sandstones are difficult to obtain with sonic derived Ø values.

4.4. Occurrence of Hydrocarbons

(i) Pebble Point Formation, 910 - 948.5 m (K.B.)

The core cut in this formation has 35% patchy, (subrounded, pinpoint up to 3 cm) irregularly distributed, even moderately bright gold to yellowish orange natural fluorescence giving a rapid streaming bright yellow cut with a very pale natural cut colour. The core had a strong hydrocarbon odour with dark brown oil bleeding from the more porous zones. Total gas in the drilling mud peaked at 4800 ppm with a background of 400 ppm.

Composition of the ditch gas was determined by the well site chromatograph as:-

Methane C1	=	97.27%
Ethane C2	=	1.42%
Propane C3	=	0.85%
Iso-Butane IC4	=	0.32%
n-Butane nC4	=	0.14%

DST-1 was carried out over interval 891-912.5 m and recovered 18.2 m (60 ft) heavily oil cut and gas cut mud, 27.4 m (90 ft.) slightly gas cut mud, 18.2 m of mud.

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4. GEOLOGY - Continued

4.4. Occurrence of Hydrocarbons - Continued

(i) Pebble Point Formation - Continued

Oil saturation determinations were carried out on four sections of whole core using the Summation of Fluids Method (See Appendix No. 4):-

1. So = 1.7% @ 915.88 - 915.94 m
2. So = 4.2% @ 916.48 - 916.55 m
3. So = 10.1% @ 917.64 - 917.72 m
4. So = 1.0% @ 918.35 - 918.40 m

The current wireline log GLOBAL interpretation does not record the presence of oil as verified by DST-1 and Core No. 1. Further lithological study of the formation is required to provide additional data prior to reprocessing of the GLOBAL program. An ammended GLOBAL interpretation is to be made available at a later date.

Geochemical analysis (Appendix No. 8) shows that the oil is a mature, non-marine waxy crude which has undergone some in-situ water washing. Although the attached report shows it to be in-situ water washed there is no evidence to support this.

N.B. In the correlation of drill, core, test and mudlog data with log data a correction of + 2.5 m is added to the former to provide matching depths with wireline log data. See Figure 7.

(ii) Paaratte Formation, 948.5 - 1198 m (K.B.)

No hydrocarbon fluorescence was observed. Total ditch gas recorded decreased with depth from 2400 ppm (C1 - C3 in the Timboon Member) to 300 ppm (C1 and C2).

(iii) Waarre Formation, 1227 - 1234.5 m

No hydrocarbon fluorescence was observed. Total ditch gas recorded was 1000 ppm (5 units) with a background of 400 ppm (2 unit @ 1 unit = 200 ppm) containing C1 and C2 only.

4. GEOLOGY - Continued

4.4. Occurrence of Hydrocarbons - Continued

(iv) Eumeralla Formation, 1234.5 - 2950 m

No hydrocarbon fluorescence was noted till the sandstone between 1946 - 1948 m which had 5% patchy to pinpoint bright pale yellow-white natural fluorescence giving a slow streaming moderately bright milky white cut fluorescence.

Incoming of C3 commenced at approximately 1560 m.

The sandstones from 2400 m downwards consistently exhibit between 40 - 100% patchy very dull gold natural fluorescence giving a very weak and very slow streaming to crush cut fluorescence with a milky white colour. Where porosity slightly improves in the sandstone, e.g. at approx. 2510 m, the colour intensity of fluorescence and cut fluorescence, and cut rate also improve.

Incoming of C4 commenced at approximately 2650 m.

Coal associated total gas peaks up to approximately 15,000 ppm (75 units) occur frequently below 2650 m with a background range of 1000 - 2000 ppm (5 - 10 units). Coals give a very slow streaming to crush milky white cut without fluorescing through the entire Eumeralla Formation.

At 2948 m a probable fracture zone (15 cm thick) was intersected that was hydrocarbon saturated. Total gas recorded was 360,000 ppm (180 units) with C1 - C5 indicated and a background of 1200 ppm (6 units). The mud had a trace of moderately bright pinpoint pale yellow oil fluorescence.

.../40

4. GEOLOGY - Continued

4.4. Occurrence of Hydrocarbons - Continued

(v) Crayfish Formation, 2950 - 3011 m (T.D.)

The sandstones from 2983 m have 2% moderately bright pinpoint to patchy, white natural fluorescence giving a weak crush to moderate streaming moderate bright blue white cut fluorescence.

The total ditch gas peaked at 15,200 ppm (76 units) with a background of 600 ppm (3 units). Chromotagraphic analysis indicated C1 to C5 and CO_2 were present.

DST-3 was carried out over interval 2980 - 3011 m (T.D.) and recovered only 70 m mud.

4.5. Source Rock - Maturation

Seventeen samples (two sidewall cores and fifteen cuttings samples) from the interval 630 - 3010 m were analysed for:-

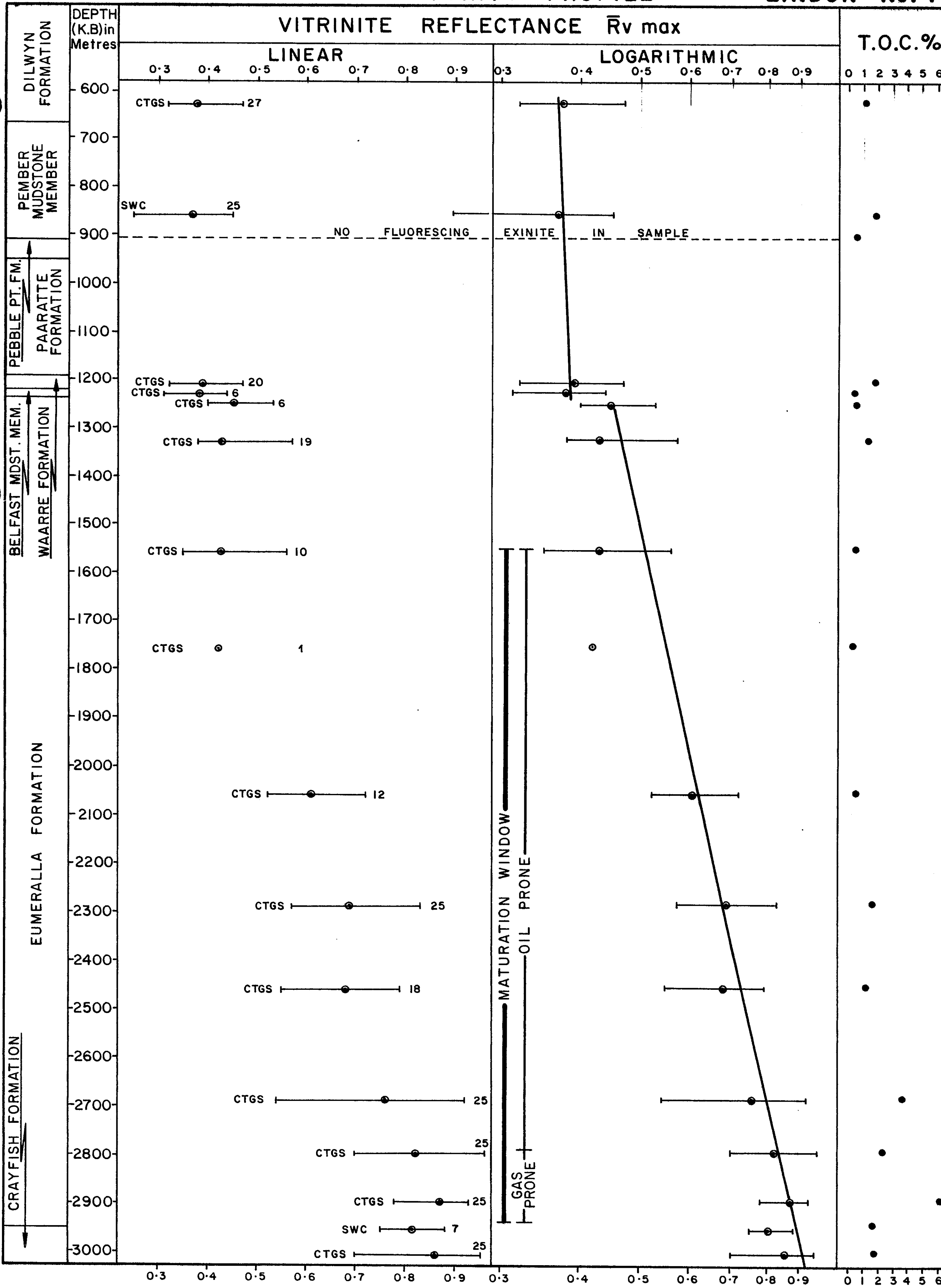
1. Maceral composition
2. Vitrinite Reflectance, Ro max
3. Total Organic Carbon, T.O.C.

The results (Appendix 13) have contributed to the following conclusions:-

1. The DILWYN FORMATION has a fair potential to generate hydrocarbons but is immature and dominantly gas-prone.
2. The PEMBER FORMATION is also immature and a fair gas-prone source.
3. The BELFAST MUDSTONE MEMBER is immature and a poor to fair gas-prone source.
4. The EUMERALLA FORMATION has good oil generating potential as indicated by the T.O.C. and Exinite content. Maturity Ro 0.5 is reached below 1500 m which coincides approximately with the first detection of measurable quantities of C3 gas.

.../41

VITRINITE SOURCE ROCK MATURITY PROFILE — LINDON No. 1



SWC ⊢—o—⊣ 6 :— R̄v max, Range, Number of Vitrinite particles in sample, sample type.

FIGURE 8

DRG No. 3174 (f)

4. GEOLOGY - Continued

4.5. Source Rock - Maturation - Continued

4. Continued

The optimum maturation is achieved with Ro = 0.7 at 2330 m. Below 1550 m the entire Eumeralla Formation (1450 m) is located within the "oil window" with Ro = 0.9 at 2950 m depth. The formation is dominantly oil prone and becomes gas prone over the deepest 150 m (See Figure 8).

5. The CRAYFISH FORMATION has reached maturity but the low maceral content (low T.O.C.) suggests a poorly gas generative source.

6. The position of the top Otway Group Unconformity between 1230 m and 1250 m was confirmed (See Figure 8).

4.6. Contributions to Geological Knowledge

4.6.1. Wangerrip Group

i. Structures in the Dilwyn Formation with its excellent porosity and intra-formational seals could be well placed to trap migrating hydrocarbons. They therefore provide future drilling targets.

ii. Dipmeter results suggests that the crest of the Pebble Point Formation lies updip to the north-east of the well location.

iii. The expected seal potential of the Pember Mudstone Member was re-affirmed.

iv. The synthetic seismogram describes the top of the Pebble Point Formation as a trough within a strong peak-trough-peak system.

v. The Pebble Point oil (28.8^{o}, API, Pour Point $33^{o}C$) is a mature, non-marine waxy crude which has undergone some water washing.

.../42

4. GEOLOGY - Continued

4.6. Contributions to Geological Knowledge - Continued

4.6.1. Wangerrip Group - Continued

vi. The vertical closure of the fault controlled structure is 97 metres with a potential net pay-zone of 29 metres in the Pebble Point Formation and 49 metres in the Timboon Sand Members. The thickness of the oil column is approximately 7.5 metres.

vii. Acceptable values of Ø = 10-18% have been obtained from the Summation of Fluids Methods and from the GLOBAL interpretation. An amended GLOBAL interpretation will be available at a later date.

4.6.2. Sherbrook Group

i. Presence of the porous and permeable sands of the Timboon Member is verified.

ii. Due to the confirmed thinness of the Belfast Mudstone Member seal potential of the underlying Waarre Formation is poor.

iii. A thin, porous (greater than 30%) section of Waarre Formation exists over a previously unencountered, hard, basal caliche unit. This basal caliche currently termed as part of the Waarre Formation, is regarded as a post-Otway Group post-depositional feature.

4.6.3. Otway Group

i. The oil prone source rock of the Eumeralla Formation reached maturity below 1550 m.

ii. The thickness of the Eumeralla Formation at Lindon-1 is 1715.5 m.

.../43

4. GEOLOGY - Continued

4.6. Contributions to Geological Knowledge - Continued

4.6.3. Otway Group - Continued

iii. The seismic reflector package, believed to mask the top of the Crayfish Formation was subsequently confirmed as intra-formational seismic events within the Eumeralla Formation associated with a series of coal seams.

iv. The sandstones of the Geltwood Beach Facies which underlie the Eumeralla Formation, at this location are tight and poorly porous. However, the presence of hydrocarbons at this level have been confirmed.

4.7. Hydrocarbon Occurrences - Alternative Contributions

4.7.1. Wangerrip Group

The well was located downdip of the structural crest. As noted in Section 4.6.1. the net pay zone of the Pebble Point Formation is 29 metres. Drilling 5 millisecs TWT updip would penetrate approximately an extra 6.5 metres of oil column with an improvement in porosity values.

The reasons for a partially oil-filled structure at the Pebble Point Formation level assuming later migration are:-

i. Flushing by meteoric waters as suggested by the relatively low water salinity (3300 - 5600 ppm Cl^-) and the water washed nature of the oil.

ii. The dominantly fault-controlled structure is not effectively closed.

iii. The process of hydrocarbon accumulation is currently in progress.

iv. The closure is too far from the main source with only limited amounts of oil reaching the structure after a long migration path.

.../44

4. GEOLOGY - Continued

4.7. Hydrocarbon Occurrences - Alternative Contributions - Continued

4.7.2. Sherbrook Group

The absence of hydrocarbons in this Group and particularly the Waarre Formation is attributed to the lack of an adequate seal thickness and to the lack of rollover. However, the shooting of additional seismic should confirm that the Lindon structure is entirely reliant on fault closure.

4.7.3. Otway Group

(i) Eumeralla Formation

The primary reason for the lack of a significant accumulation of hydrocarbons is the absence of porous sands.

(ii) Crayfish Formation

There are a number of factors controlling the results of testing in the Crayfish Formation:-

. The well was not located on a closed structure.

.. The abundant potassium deficient clay matrix prevented any flow from the tight sandstones.

DIAGRAMMATIC SW–NE CROSS SECTION OF LINDON-1 STRUCTURE AT PEBBLE POINT FORMATION

(NOT TO SCALE)

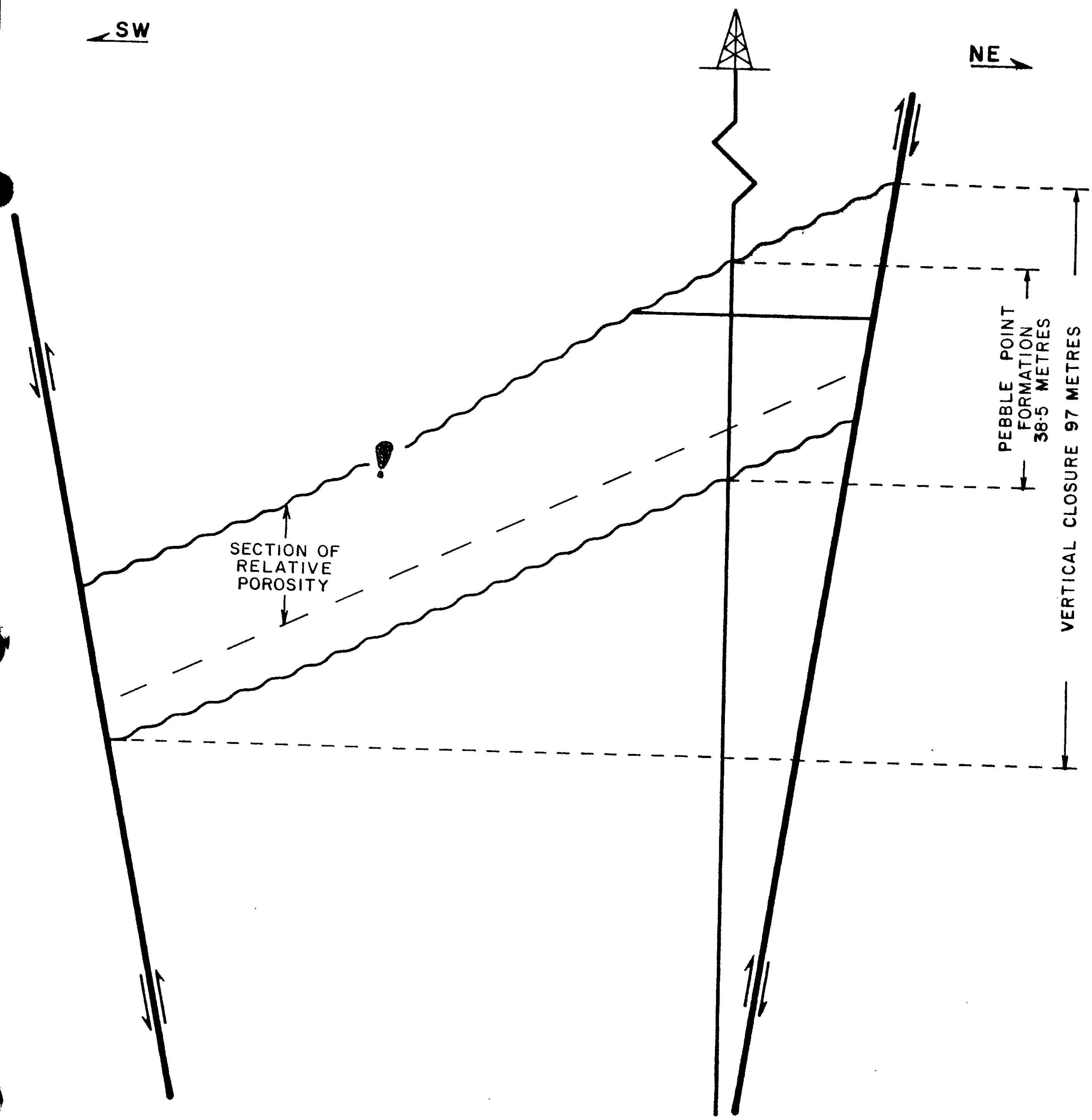
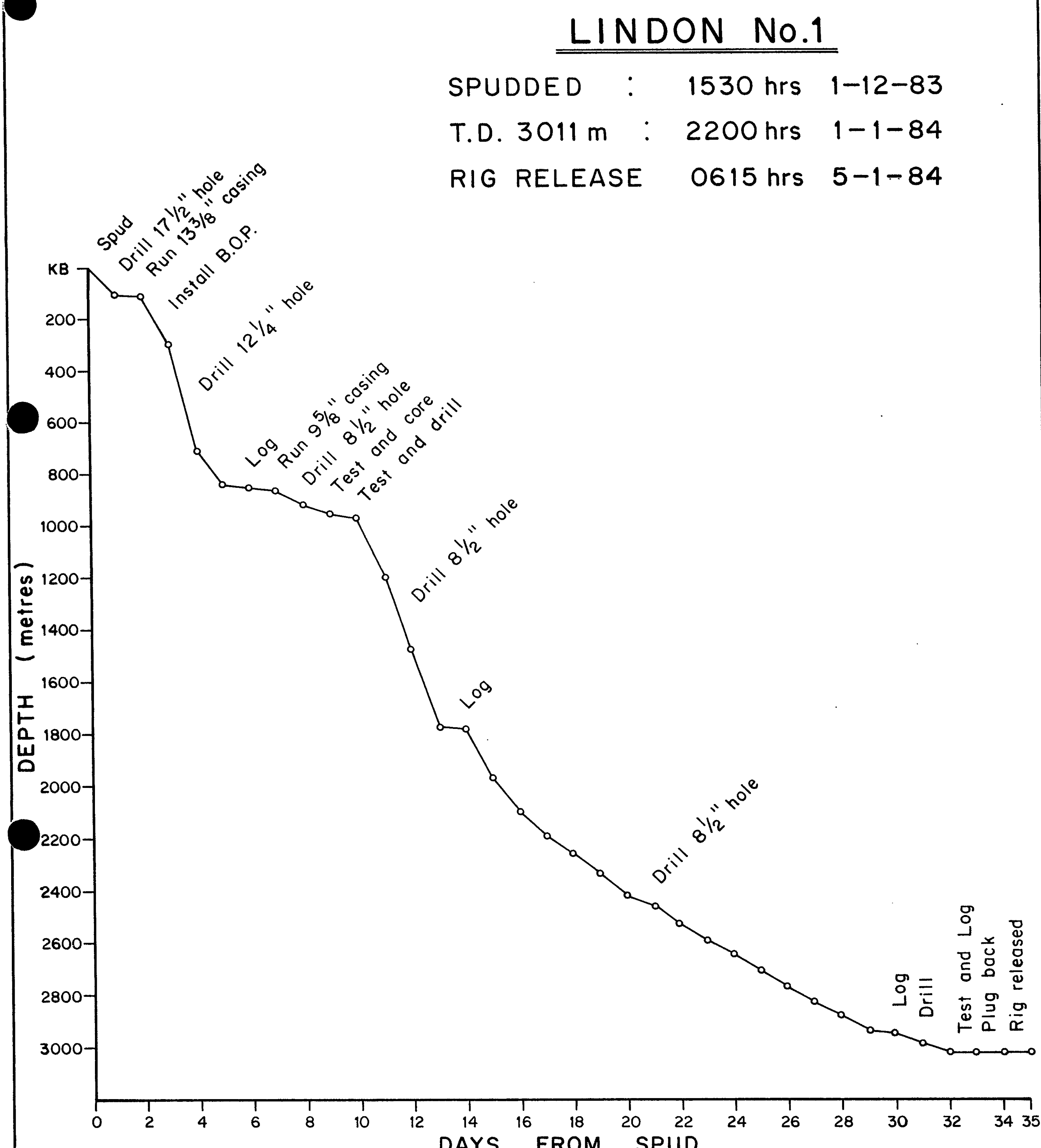


FIGURE 9

APPENDIX 1.

ACTUAL PENETRATION PROFILE



ACTUAL PENETRATION PROFILE

DRG No OT.3155(F)

APPENDIX 2

BIT RECORD

BEACH PETROLEUM

RIG: RICHTER RIG 14 BIT RECORD WELL: LINDON 1 SPUD DATE: 1/12/83

Bit no.	Size	Make	Type	IADC Code	Serial number	Depth out	Feet MTRS	Hours	Cum. Hours	Av. ROP	WOB 1000 LBS	RPM	BHA	Dev	Jets	GPM	Press	MUD WT	MUD vis	MUD WL	Bit Cond			Remarks.
1RR	17-½	HTC	OSC-34J	1.1.1.	KT 468	348'	348'	6-3/4	6-3/4	51.6	5-10	120	Slick	$3/4^{o}$	3x24	435	400	8.6	35	-	2	2	I	Surface casing point
2	12-½	HTC	J1	1.1.6.	BM 914	2789'	2441'	31-½	38-¼	77.5	35	120	Slick	1^{o}	15.16.16	550	1650	8.8	40	13.4	7	4	1-1/16	Intermediate casing point
3	8-½	HTC	J1	1.1.6.	006 FS	2994'	205'	5-½	43-3/4	37.3	25-35	120	Slick	-	10.10.11	220	600	8.6	45	17.5	6	2	1	Pulled for DST# 1
CHI RR	8-15/32	CDP	C-18	-	31857F	3009'	15'	2-½	46-¼	6.0	7-11	90	-	-	-	240		8.6	45	12.4	10%	WORN		Barrel jammed 89% rec;
4	8-½	HTC	J3	1.3.6.	816 VK	3041	42'	½	46-3/4	84.0	11	50	Slick	-	3x9	220	1000	8.7	42	10.4	1	1	I	Pulled for DST# 2
RR4	8-½	HTC	J3	1.3.6.	816 VK	3937'	896'	17-¼	64	51.9	25-35	100/120	Slick	3-¼	3x9	264	1550	8.8	42	9.5	8	2	¼	Pulled due to slow penetration
5	8-½	HTC	J-22	5.1.7.	708 SS	5818'	1881'	39-¼	103-¼	47.9	25-35	65	Stab at 60'	2^{o}	3x9	275	1700	9.5	41	8	1	1	I	Pulled for logging
6	8-½	HTC	J-22	5.1.7.	712-SS	2196m	423m	73-3/4	177	5.7	16	70/80	"	2-¼	9/9/11	275	"	9.7	39	8.5	1	4	I	Pulled - Slow R.O.P
7	8-½	"	J-11		430 VA	2430m	234	65-¼	242-¼	3.58	17	60/80	"	3^{o}	"	275	"	"	42	9.5	B 2	7	1	Broken inserts Bearings locking
5RR	"	"	J-22		708-SS	2619m	189	70	312-¼	2.7	17	70	"	3-½	"	"	"	9.6	41	14	B 2	7	1-1/16	One broken insert Bearings done
8	"	"	"		774-SS	2830m	211	74	386-¼	2.85	17	70	"	3-3/4	"	"	"	"	40	11	B 1	7	I	Broken inserts Bearings done
9	"	"	"		773 SS	2954m	124	50	436-¼	2.48	15	70	"	4	"	"	"	"	42	9.4	1	8	I	1 Loose cone
10	"	SEC	M 44		334427	3011m	57	22-¼	58-½	2.56	15	70	"	3-¼	10/10/11	290	1600	"	41	10	2	2	I	Seals ruptured w/-
																								POH (otherwise Green)

NOTE: Indicate reason for pulling bit.

Symbols for grading dull bits

RR/NR :Rerunnable / not rerunnable

BT/WT/LT :Broken / worn / loose or lost teeth

RG :Rounded gage

SF/SE/SQ :Seals failed / effective / questionable

N/M/H :Nose / middle / heel row

1/2/3 :Cone number

Additional comments:

APPENDIX 3

CORE NO. 1 - DESCRIPTION

- Pebble Point Formation

BEACH PETROLEUM N.L.

CORE DESCRIPTION

DATE 10/12/83

CORE NO. 1

WELL LINDON NO. 1

DRILLER'S INTERVAL 912.5 - 917 m

COMPANY BEACH PETROLEUM

LOG INTERVAL 912.5 - 917 m

LICENCE AREA P.E.P. 105

RECOVERY 4 m (89%)

LOCATION 38° 04' 05.5" E; 141° 30' 54.7"

FORMATION PEBBLE POINT

ELEVATION 63.3 m A.S.L.

GEOLOGIST S. GUBA

DEPTH (M)	LITHOL.	DRILL RATE	DESCRIPTION
		m/hr	SANDSTONE, medium-dark green grey, friable to firm, very fine to very coarse, dominantly fine and coarse - bimodal subrounded, very poorly sorted, quartz grains commonly iron stained, common dark green grey, coarse grained oolites, abundant dark green grey argillaceous matrix/ cement increasing over last 20 cm., rare calcareous cement poor to very poor porosity with depth.
912.5		1.1	
913		6.6	The Core has 35% patchy (subrounded, pinpoint up to 3 cm), irregular distribution, even moderately bright gold to yellowish orange natural fluor. giving a rapid streaming bright yellow cut. Fluorescence with a pale stain natural cut color. The core had a strong hydrocarbon odour with dark brown oil bleeding from the more porous portions.
914		10.1	Estimated porosity average 5% with minor intervals throughout length of core(approx. 2% of total core) with porosity of 10-15%.
915		9.2	
916		0.1	
917			

APPENDIX 4

CORE NO. 1

Plug Analysis and Whole Core Analysis
Results for the Pebble Point Formation

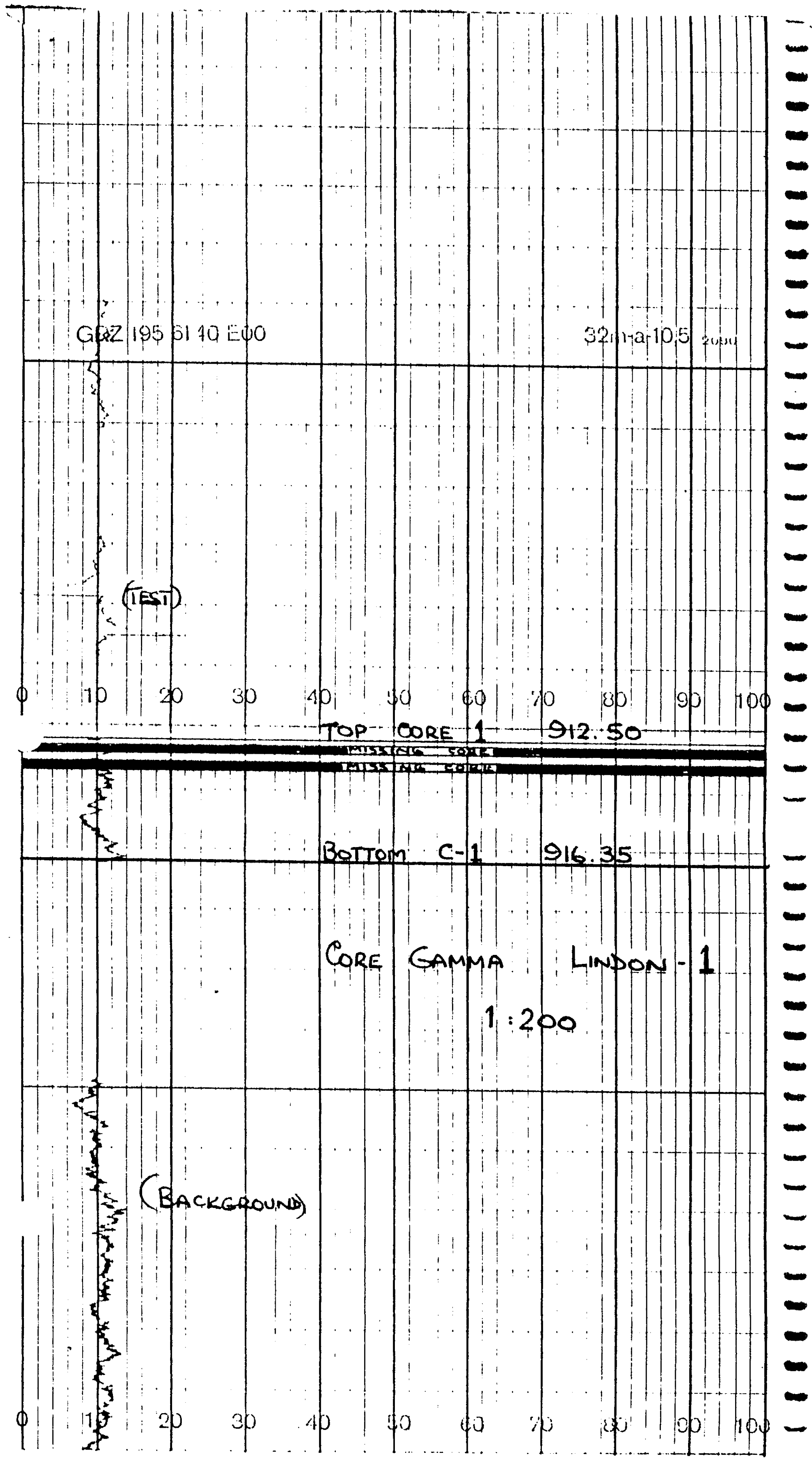
CORE ANALYSIS RESULTS

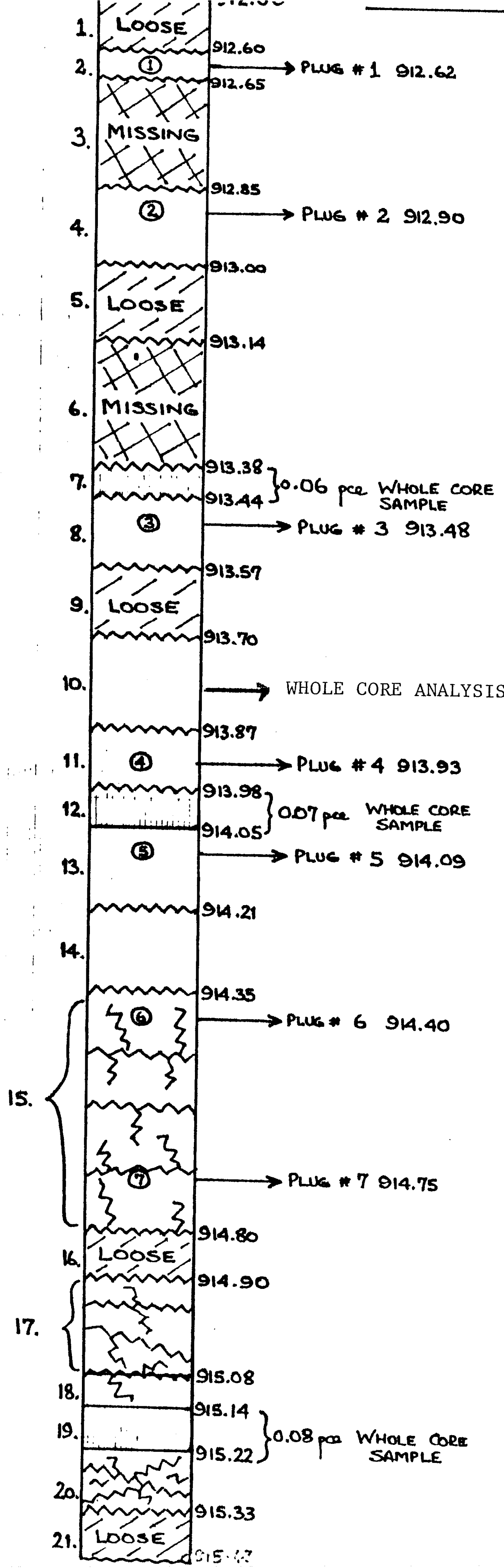
BEACH PETROLEUM

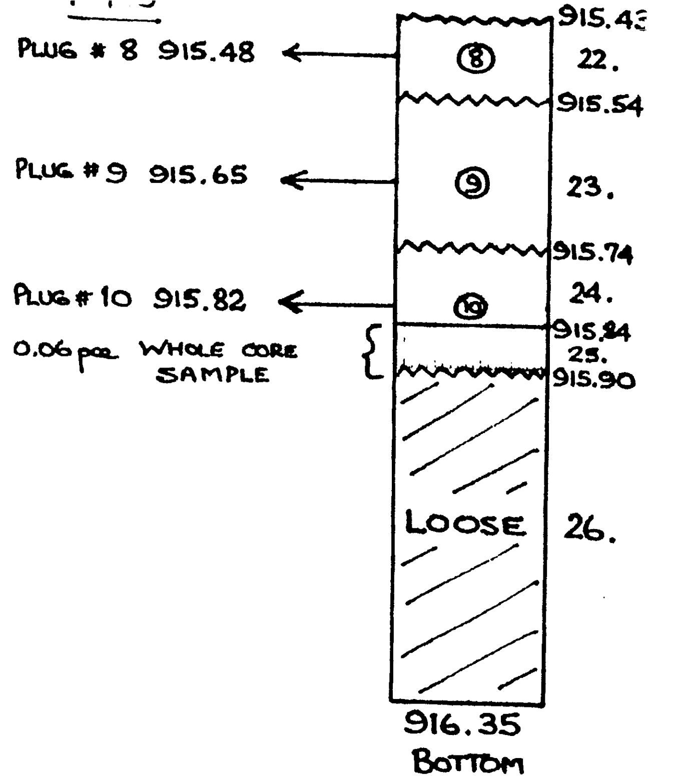
LINDON NO:1

CORE LAB

CORE LABORATORIES AUSTRALIA (QLD.) LTD.
OFFICE—2nd FLOOR, 33 KING WILLIAM STREET, ADELAIDE 5000
LABORATORY—1/22 COMPTON STREET, ADELAIDE 5000
PHONE—OFFICE: 212 7212   LAB: 212 7612
TELEX: CORADL AA 87011


(TEST)
0 10 20 30 40 50 60 70 80 90 100
TOP CORE 1 912.50
MISSING CORE
MISSING CORE
BOTTOM C-1 916.35
CORE GAMMA LINDON-1
1:200
(BACKGROUND)
0 10 20 30 40 50 60 70 80 90 100





PLUG INFORMATION:

1)	912.62	-	CONVENTIONAL			
2)	912.90	-	LEAD :	8.01	SCREENS :	2.0
3)	913.48	-	"	7.76	"	1.9
4)	913.93	-	"	7.76	"	1.9
5)	914.09	-	"	7.72	"	1.9
6)	914.40	-	"	6.50	"	2.0
7)	914.75	-	"	7.57	"	2.0
8)	915.48	-	"	4.87	"	2.0
9)	915.65	-	"	4.20	"	1.9
10)	915.82	-	"	5.45	"	2.0

WHOLE CORE SAMPLES:

1) 913.38 - 913.44
2) 913.98 - 914.05
3) 915.14 - 915.22
4) 915.84 - 915.90

CL-511-1

CORE LABORATORIES, INC.

Petroleum Reservoir Engineering
DALLAS, TEXAS

CORE ANALYSIS RESULTS

Company BEACH PETROLEUM Formation ____ File ADCA 83-017
Well LINDON NO:1 Core Type CONVENTIONAL Date Report 16.1.84
Field LINDON Drilling Fluid ____ Analysts PL
County ____ State VICTORIA Elev. ____ Location ____

Lithological Abbreviations

SAND — SD, SHALE — SH, LIME — LM; DOLOMITE — DOL, CHERT — CH, GYPSUM — GYP; ANHYDRITE — ANHY, CONGLOMERATE — CONG, FOSSILIFEROUS — FOSS; SANDY — SDY, SHALY — SHY, LIMY — LMY; FINE — FN, MEDIUM — MED, COARSE — CSE; CRYSTALLINE — XLN, GRAIN — GRN, GRANULAR — GRNL; BROWN — BRN, GRAY — GY, VUGGY — VGY; FRACTURED — FRAC, LAMINATION — LAM, STYLOLITIC — STY; SLIGHTLY — SL/, VERY — V/, WITH — W/

SAMPLE NUMBER	DEPTH ~~FEET~~ metres	CORRECTED	PERMEABILITY MILLIDARCYS	POROSITY PER CENT	RESIDUAL SATURATION PER CENT PORE: OIL	RESIDUAL SATURATION PER CENT PORE: TOTAL WATER	GRAIN DENSITY	SAMPLE DESCRIPTION AND REMARKS
1	912.62	(915.12)	0.02	5.5			3.09	SST: gy/brn, f-cse grn, fri to frm, ang-subrnd, p-srtd, abun cly mtx, slightly calc, abun lim cmt, abun glauc micaceous, tr carb specks, tr dull yell/wh patchy cluor, slow str cut.
2	912.90	(915.4)	424	21.7			2.95	SST: dk brn/gy, f-cse grn, fri, subang-rnd, p-srtd, abun cly mtx, abun lim cmt, abun glauc micaceous, tr carb specks, tr dull yell/wh patchy fluor, instant cut.
3	913.48	(915.98)	78	19.5			2.85	SST: dk brn/gy, f-cse grn, fri, subang-rnd, p-srtd, abun cly mtx, tr glauc only mic tr carb specks, dull yell/org uniform fluor, instant cut.
4	913.93	(916.43)	72	19.2			2.86	SST: dk brn/gy, f-cse grn, fri, ang-rnd, p-srtd, abun cly mtx, tr calc, mic i/p tr carb specks, dull yell/org uniform fluor, instant cut.
5	914.09	(916.59)	790	27.7			2.72	SST: dk brn/gy, f-cse grn, fri, ang-rnd, p-srtd, abun cly mtx, tr clac, mic i/p tr carb specks, dull yell/org uniform fluor, instant cut.
6	914.40	(916.90)	254	22.4 19.6 (using overburden pressure @1200psi)			2.80	SST: dk brn/gy, f-occ cse predom med grn, fri, ang-rnd, med-pr srtd, abun cly mtx, mic i/p, tr carb specks, dull yell/org patchy fluor, fast str to instant cut.

CL-811-1

CORE LABORATORIES, INC.

Petroleum Reservoir Engineering
DALLAS, TEXAS

CORE ANALYSIS RESULTS

Company BEACH PETROLEUM Formation File ADCA 83-017
Well LINDON NO:1 Core Type CONVENTIONAL Date Report 16.1.84
Field LINDON Drilling Fluid Analysts PL
County State VICTORIA Elev. Location

Lithological Abbreviations

SAND – SD	DOLOMITE – DOL	ANHYDRITE – ANHY	SANDY – SDY	FINE – FN	CRYSTALLINE – XLN	BROWN – BRN	FRACTURED – FRAC	SLIGHTLY – SL/
SHALE – SH	CHERT – CH	CONGLOMERATE – CONG	SHALY – SHY	MEDIUM – MED	GRAIN – GRN	GRAY – GY	LAMINATION – LAM	VERY – V/
LIME – LM	GYPSUM – GYP	FOSSILIFEROUS – FOSS	LIMY – LMY	COARSE – CSE	GRANULAR – GRNL	VUGGY – VGY	STYLOLITIC – STY	WITH – W/

SAMPLE NUMBER	DEPTH ~~XXX~~ meters (CORRECTED)	PERMEABILITY MILLIDARCYS	POROSITY PER CENT	RESIDUAL SATURATION PER CENT PORE: OIL	RESIDUAL SATURATION PER CENT PORE: TOTAL WATER	GRAIN DENSITY	SAMPLE DESCRIPTION AND REMARKS
7	914.75 (917.25)	1135	26.5			2.68	SST: dk brn/gy, f-occ cse predom med grn, fri, ang-rnd, med-pr srtd, abun cly mtx, mic i/p, tr carb specks, dull yell/org uniform fluor, instant cut.
8	915.48 (917.98)	904	28.2			2.68	SST: dk brn/gy, f-cse grn, fri, ang-rnd, mod-pr srtd, abun cly mtx, mic i/p, tr carb specks dull yell uniform fluor, instant cut.
9	915.65 (918.15)	231	24.3 22.5 (using overburden pressure @1200psi)			2.73	SST: dk brn/gy, f-cse grn, fri, ang-rnd, mod-pr srtd, abun cly mtx, mic i/p, tr carb specks dull yell patchy fluor, instant cut.
10	915.82 (918.32)	639	13.2			2.99	SST: dk brn/gy, f-cse grn, fri, ang-rnd, mod-pr srtd, abun cly mtx, mic i/p, tr carb specks dull yell patchy fluor, instant cut.
11 *	913.38-913.44 (915.88-915.94)		12.1	1.7	76.5		SST: gy/brn, f-cse grn, fri, ang-subrnd, p-srtd, abun cly mtx, tr calc, mic i/p, tr carb specks, dull yell/org patchy fluor, instant cut.
12*	913.48-914.05 (916.48-916.55)		12.5	4.2	71.7		SST: gy/dk brn, f-cse grn, fri, ang-rnd, p-srtd, abun cly mtx, tr calc, mic i/p, tr carb specks, dull yell/org uniform fluor, instant cut.

CL-511-1

CORE LABORATORIES, INC.

Petroleum Reservoir Engineering
DALLAS, TEXAS

CORE ANALYSIS RESULTS

Company BEACH PETROLEUM Formation ______ File ADCA 83-017
Well LINDON NO:1 Core Type CONVENTIONAL Date Report 16.1.84
Field LINDON Drilling Fluid ______ Analysts PL
County ______ State VICTORIA Elev. ______ Location ______

Lithological Abbreviations

SAND — SD	DOLOMITE — DOL	ANHYDRITE — ANHY	SANDY — SDY	FINE — FN	CRYSTALLINE — XLN	BROWN — BRN	FRACTURED — FRAC	SLIGHTLY — SL/
SHALE — SH	CHERT — CH	CONGLOMERATE — CONG	SHALY — SHY	MEDIUM — MED	GRAIN — GRN	GRAY — GY	LAMINATION — LAM	VERY — V/
LIME — LM	GYPSUM — GYP	FOSSILIFEROUS — FOSS	LIMY — LMY	COARSE — CSE	GRANULAR — GRNL	VUGGY — VGY	STYLOLITIC — STY	WITH — W/

SAMPLE NUMBER	DEPTH ~~xxx~~ metres	PERMEABILITY MILLIDARCYS	POROSITY PER CENT	RESIDUAL SATURATION PER CENT PORE: OIL	RESIDUAL SATURATION PER CENT PORE: TOTAL WATER	GRAIN DENSITY	SAMPLE DESCRIPTION AND REMARKS
13*	915.14-915.22	CORRECTED 917.64-917.72	18.9	10.1	70.9		SST: gy/dk brn, f-cse grn, fri, ang-rnd, p-srtd, abun cly mtx, tr calc, mic i/p, tr carb specks, dull yell uniform fluor, instant cut.
14*	915.84-915.90	918.35 - 918.40	9.7	1.0	85.6		SST: gy/dk brn, f-cse grn, fri, ang-rnd, p-srtd, abun cly mtx, tr calc, mic i/p, tr carb specks dull yell uniform fluor, instant cut.

* Preserved Core Pieces

Samples 2-10 are mounted in lead sleeves

4 MARLOW ROAD, KESWICK, 5035. G.P.O. BOX 126, ADELAIDE, S.A. 5001
TELEPHONE (08) 297 0777 TELEX 87011

CORE LABORATORIES AUSTRALIA (QLD) LTD CORE

PL/JRH
6 February, 1984

Beach Petroleum
685 Bourke Road
Camberwell
VICTORIA 3124

Attention: Mr. D.G. Langdon

Dear Sir,

SUBJECT : CORE ANALYSIS
WELL : LINDON NO. 1
FILE : ADCA 83-017

Following a request by Mr. S. Guba, Core Laboratories (Qld) Ltd. performed measurements at overburden pressures of two plug samples from the subject well. The results are as follows:-

SAMPLE ID.	DEPTH METRES	POROSITY - PERCENT 0 PSI	1200 PSI
6	914.40	21.4	19.6
9	915.65	24.3	22.5

If you have any questions regarding this data please do not hesitate to contact us.

Yours faithfully,

PETER LANE
LAB. SUPERVISOR

CL-511-1

CORE LABORATORIES, INC.

Petroleum Reservoir Engineering

DALLAS, TEXAS

CORE ANALYSIS RESULTS

Company BEACH PETROLEUM N. L. Formation ____ File WA-CA-291

Well LINDON NO.1. Core Type FULL DIAMETER Date Report 21st MAY, 1984

Field ____ Drilling Fluid ____ Analysts AF, GK

County AUSTRALIA State VICTORIA Elev. ____ Location OTWAY BASIN

SAMPLE NUMBER	DEPTH METRES	PERMEABILITY MD HORIZ MAX KA	PERMEABILITY MD HORIZ 90° KA	PERMEABILITY MD VERT KA	POROSITY % HE INJ	GRAIN DENSITY
CORE NO.1.						
1.	916.2-916.37	83	68	12	23.0	2.78

APPENDIX 5

DETAILS OF DRILLING PLANT

RICHTER DRILLING

ROTARY RIG NO. 14

DRAWWORKS	National 80 UE with National B1 Catheads. 2 x GE752 Dual Electric Motor Drive. 4 Hoisting and 2 Rotary speeds. Drum grooved for 1-1/4" Line. 46" x 10-3/8" Brakes. Baylor 6010 Auxiliary Brake with National Brake Cooling System. Coring Reel. Satellite SA100 Automatic Driller.
COMPOUND	N/A. Electric Drive.
ENGINES	3 Caterpillar D399TA Diesel oilfield engines.
SUBSTRUCTURE	Floor height 20'. 32'6" x 32" Casing capacity 650,000 lb. Setback capacity 400,000 lb.
RIG LIGHTING	LSI Heavy Duty System. 120 volt, 60 HTZ. 48" double tube 40 watt fluorescent fixtures. 9 double fixtures in mast plus crown "obstruction" light. 1 double fixture at racking platform. 4 double fixtures floor lights.
MAST	142' x 25' mast. Gross nominal capacity 1,000,000 lb. 10 lines - 714,000 lb. 8 lines - 666,000 lb.
SWIVEL	National P400.
CROWN BLOCK	Working cluster of 5 x 42" sheaves. 1 x 60" fastline sheave. Grooved for 1-1/4" wire.
TRAVELLING BLOCK	National 545G350 Hook Block, 350 ton.
KELLY DRIVE	Varco 27 HDP Kelly Drive Bushing.

MUD PUMPS	Two National 9-P-100, 6-3/4" x 9-1/4" Triplex single acting pumps. Driven by GE752 Electric Motor.
MIXING PUMPS	Warman 6 x 4 centrifugal pumps with 75 HP Motors. Pioneer SE800 Sidewinder Mud Mixer.
MUD AGITATOR	4 Brandt MA7-1/2 agitators with 36" dia. Impellor.
SHALE SHAKERS	Brandt dual tandem screen separator. Rated at : 1400 GPM with 20 x 40 screens and 9 lb mud. : 750 GPM with 40 x 80 screens and 16 lb mud.
DESANDER	Demco 86V with 6 x 8" cones.
DESILTER	Pioneer T16-4 Siltmaster with 16 x 4" cones.
GENERATORS	Three 1030 KW 1287.5 KVA Brushless revolving field generators.
BOP's & ACCUMULATOR	a) Two Hydril 13-5/8" 5000 PSI type "V" RAM BOP's. Rams for 2-7/8", 3-1/2", 4-1/2", 7", 9-5/8" and Blind. b) Hydril 13-5/8" - 5000 Annular Preventor. c) Koomey 120 - 11S Type 80 Accumulator, twelve 11 gallon accumulators.
KELLY COCK - UPPER	4-1/4" 10,000 psi Hydril Kelly Guard. 7-3/4" OD, 2-13/16" ID.
KELLY COCK - LOWER	4-1/4" 110,000 psi Hydril Kelly Guard 6-5/8" OD, 2-13/16" ID.
AIR COMPRESSORS and RECEIVERS	Two Sullair Model 10-30L Compressor. One Atlas Copco LT930 Cold Start Compressor. One 240 gal. 200 psi, 92" x 30" Air Receiver. One 300 gal. 200 psi, Air Receiver in substructure.

SCR SYSTEM

Baylor SH4-4-7 Thyrig III system to control and power seven GE752 drilling motors and three CAT399 engine/generator sets with:

- motor control panel
- 750 KVA 3 phase 600/480V power transformer
- 75 KV 3 phase 600/120-208V power transformer

housed in skid mounted metal power house.

SPOOLS

a) 13-5/8" 5M x 13-5/8" 5M with two 4" flanged outlets.

b) Double studded adaptor flanges :
  - 13-5/8 5M x 13-5/8 3M
  - 13-5/8 5M x 11 3M
  - 13-5/8 5M x 9 3M
  - 13-5/8 5M x 7-1/16 3M

ROTARY TABLE

National C375 37-1/2" with Varco MPCH Solid Master Bushing, Pin Drive.

MUD TANKS

Three tanks - 850 bbl system.

CHOKE MANIFOLD

5000 psi Manifold. With 4" valves and 3" chokes.

DRILL PIPE

10000 ft 4-1/2" OD, 16.6 lb/ft, Grade E, Range 2 Drill Pipe with 4" IF connections.

DRILL COLLARS

15 8" OD Slick Drill Collars 30' long, with 6-5/8 Reg connections.
30 6-1/2" OD Slick Drill Collars, 30' long, with 4-1/2 IF connections.

KELLY

5-1/4" Hex Kelly, 40' overall, 37' working space.

FISHING TOOLS

9-5/8" FS overshot
8-1/8" FS overshot
6-1/2" OD Type Z oil jar
Reverse Circ Junk Basket 7-7/8" OD
Junk Sub. 6-5/8" OD
Fishing Magnet 7" OD
Junk Mill 8-1/4" OD
12 Joints 8-1/8" Washover String
1 Jar intensifier 6-1/4" OD

HANDLING TOOLS	1 set 2-3/4" x 132" links 1 set 2-3/4" x 108" links 2 sets BJ MGG 4-1/2" elevators Side Door 150 ton elevators for 20", 13-3/8", 9-5/8" and 7". Single Joint elevators for 20", 13-3/8", 9-5/8" and 7". Center latch elevators for 2-7/8" DP One BJ 350 ton elevator spider, with slips for 13-3/8", 9-5/8" and 7". Wooley super B tongs with jaws 3-1/2" through 13-3/8" plus extended head assys for 13-3/8" - 19" and 20" - 21-1/2". BJ "SDD" tongs with jaws 4" - 8-1/2" and 8-1/2" - 12". Lamb Model 16000 power tong 5", 2-3/8", 2-7/8", 3-1/2", 7", 9-5/8" and 13-3/8". Spinnerhawk Pipe Spinner 2-7/8" - 7". Varco SDXL DP Slips. DCS-L Collar Slips. CMS-XL Casing Slips.
WELDING EQUIPMENT	Lincoln 400AS Diesel Welder.
DRILLING DATA RECORDER	Geolograph 6 Pen Dril-Sentry Recorder.
DEVIATION INSTRUMENT	Totco Unit No. 0-8 degree Double Recorder.
TOOL HOUSE	20' x 9' x 8' - skid mounted.
JG HOUSE	24' x 9' x 8' - skid mounted.
PIPE RACKS	5 sets - fabricated.
CATWALKS	Fabricated.
WATER TANK	400 bbl gallon tank.
FUEL TANKS	20,000 litre tank.

<u>SUBSTITUTES</u>	Two 8" OD 4-1/2 IF box x 6-5/8" API Reg Pin.
	Two 6-1/2" OD 4-1/2 IF box 4" IF pin.
	Two 8" OD 6-5/8" API Reg box x box.
	Two 6-1/2" OD 4-1/2" IF Box x 4-1/2" Reg Box.
	Lift subs 4-1/2" IF Pin. Lift subs 6-5/8" Reg Pin.
	Two XO subs 4-1/2 IF Box x 6-5/8" Reg Pin.
	Two Kelly Saver Subs.
	Two XO subs 4-1/2 XH Box x 6-5/8" Reg Pin.
	Bit sub 6-5/8" Reg Box x 7-5/8" Reg Box.
	2-XO subs 4" IF Box x 4-1/2 IF pin.
<u>INSTRUMENTS & INDICATORS</u>	MD Type E weight indicator. MD Tong Torque indicator. MD RPM Tachometer System. MD Torque Meter. MD Mud Volume Totaliser System. MD Mud Flow Fill and Stroke System.
<u>MUD TESTING</u>	Baroid No. 821 Rig Lab.
<u>JUNK BOX</u>	Two Junk Boxes 20' x 7'6" x 3'
<u>RATHOLE DRILLER</u>	Fabricated.
<u>MUD SAVER</u>	Oteco Mud Guard with 5" seals.
<u>CELLAR PUMP</u>	Cellar jet run off trip tank pump.
<u>MATTING</u>	12" x 3" timber matting in angle iron frame.
<u>RIG TELEPHONE</u>	Nil

BOP WALKWAY	As required.
WATER PUMPS	Two Mission 3 x 2 with 25 HP motors.
FIRE EXTINGUISHERS	As required.
TRANSPORT AND EQUIPMENT AND MOTOR VEHICLES	(1) Gin Pole Truck (2) International 530 Payloader (3) Two Toyota Landcruisers

BARAROID
NL INDUSTRIES

BAROID AUSTRALIA PTY. LIMITED

WELL SUMMARY

Baroid Engineers: M. Olejniczak

	Operator	: Beach Petroleum
	Well Number	: Lindon #1
	Location	: Heywood, Victoria
	Contractor	: Richter Drilling
	Rig	: 14
	Total Depth	: 3011m
	Water Depth/KB to Ocean Floor	: 6.5m RKB to Surface
	Arrived on Location	: 28th November, 1983
	Spud Date	: 1st December, 1983
*	Date Reached T.D.	: 1st January, 1984
*	Total Days Drilling	: 34
	Date off Location	: P. & A. on 3rd January, 1984
	Total Days on Well	: 37
*	Total Cost of Mud Materials	: $45,272.41
*	Mud Costs/m	: $15.07
*	Mud Costs/day	: $1,331.54
	Engineer Service (37 days) @ $ 265.00	: $9,805.00
	Total Cost Materials and Engineer Service	: $55,077.41
	Mud Materials not Charged to Drilling	: -
	Engineer Service Not Charged to Drilling	: -
	Casing Program	: 13.3/8" @ 102m 9.5/8" @ 850m

* Calculated as from actual spud to P and A or final casing run and testing program started etc.

DISCUSSION BY INTERVAL

17½" Hole, Surface to 106m

The well was spudded in on 1st December, 1983, and the 17½" hole drilled without problems to 106m in 6.3/4 hours rotating time.

LIME flocculated AQUAGEL was used as a spud mud with viscosity maintained around 35 seconds with additions of LIME. Hole cleaning at this viscosity appeared to be quite adequate, despite a slow pump rate used to avoid hole washout.

As the mud making marl of the Heytesbury Group was expected at any point tried to minimise consumption of AQUAGEL by circulating only through the trough and the suction tank. However the bypass trough was unable to handle the flow, so had to revert to using the complete mud system, with the desander and desilter running.

The marl was eventually reached at 77m, but it was not strongly mud-making, so LIME additions had to be continued to maintain viscosity.

At 103m the hole was circulated clean, a wiper trip run, and then the hole was again circulated clean before POOH, and successfully running and cementing the 13.3/8" casing to 102m.

.../Cont.

DISCUSSION BY INTERVAL

12¼" Hole, 106 - 850m

The 13.3/8" casing shoe was drilled out using the old mud from the 17½" hole further thinned down with water to reduce the effects of cement contamination. No chemical treatment was used as the increased calcium content from the cement was considered beneficial in providing clay inhibition during further drilling of the marl.

After running a leak-off test at 109m, resumed rapid drilling through the marl maintaining volume and viscosity with water and LIME only.

At 211m had to stop drilling to clear the flowline and ball nipple of a solid mass of hard sticky marl. This appeared not to be a "mud ring" in the traditional sense, but rather the result of an excessive drill rate causing the buildup and compacting together of very firm, sticky marl cuttings. The drill pipe even had a section of this around it as a collar which had to be cut and peeled off. 4.3/4 hours were spent clearing this mess, with an estimated 700 bbls of water pumped into the hole, with returns going directly into the sump.

On resuming drilling added all the drilling detergent on site in an attempt to avoid a recurrence of the problem, but drilled out of the marl into the Dilwyn Sands soon after.

As rapid drilling continued into the sands, began to get a foaming problem which was not reduced by additions of defoamer. As it appeared to be the result of the interaction between the low solids LIME flocculated mud and the added drilling detergents, the mud was deflocculated with BICARBONATE and the foam disappeared soon after.

.../Cont.

DISCUSSION BY INTERVAL (Cont.)

12¼" Hole (Cont.)

Following this LIME additions were stopped, and viscosity then maintained predominantly with ALCOMER 1773, a bentonite extender, with additional AQUAGEL as considered necessary. Most of the water added to maintain volume during this section was reclaimed from the sump using a small fire pump.

After 700m began slowly adding further AQUAGEL, and then began adding CMC-E.H.V. once it appeared that had reached the Pember Mudstone, to reduce the water loss to less than 15 ccs prior to logging.

At the 850m T.D. the hole was circulated clean for ½ hour prior to running a wiper trip with no drag or fill. The hole was then again circulated ½ hour prior to running logs, running and cementing the 9.5/8" casing without problems.

DISCUSSION BY INTERVAL (Cont.)

8½" Hole, 850 - 3011m

While nippling up after running and cementing the 9.5/8" casing, the mud pits were dumped and cleaned of all the old mud and new KCl/Polymer mud mixed.

The casing shoe and cement, were then drilled out, circulating with water through the suction tank only to avoid unnecessary contamination of the new mud. At 854m while running a leak off test the water was dumped and switched over to using the new KCl/Polymer mud.

Initially the potassium concentration was maintained at approximately 6% with a viscosity of 42-45 seconds. The fluid loss dropped rapidly as drill solids increased, so that by the time we had drilled into the Pebble Point Formation it had dropped below 17.5 ccs, but was at 12.4 ccs at the time of DST #1 at 912.5m (an acceptable level). By the time DST #1, Core #1 and DST #2 had been run in this formation to a depth of 927m the filtrate had been reduced to 10.4 ccs.

Drilling then proceeded through the next target, the Warre Sandstone, to an intermediate logging point at 1773m. The mud weight rose steadily up to a 1.15 S.G., as this was fairly rapid drilling despite running all the solids equipment. The viscosity was maintained at about 40 seconds, with low gels and a water loss around 8.5 ccs, indicating that the mud was in good condition. The caliper log showed a relatively good hole of 8-10" with some washout in sands around 900m, which was to be expected.

After logging the drilling rate slowed down rapidly, with the majority of the remainder of the well, down to the next logging point at 2954m, drilling at between 4 to 2 m/hr. This entire section was a very uniform clay/shale sequence

.../Cont.

DISCUSSION BY INTERVAL (Cont.)

8½" Hole (Cont.)

of the Eumerella Formation. This section adversely effected mud properties as the clay became very dispersive causing a continued increase in drill solids up to 8% with the mud weight increasing to 1.20 S.G. by 2100m. At first this did not effect the rheology or water loss too much, except for a slight increase in the gel strengths. However by 2300m, polymer stocks on site had begun to get low, while the Pretty Hill Sandstone (the final target) was expected at any time and the holiday season was approaching during which time it would be difficult to get additional stocks.

This combination of factors led to a polymer consumption being limited to some degree, so that the mud properties through to the end of the well occasionally reflect this.

For instance gel strengths increased up to 5/20 and water loss rose to 10 ccs by 2440m. Meanwhile the mud weight had continued to increase up to 1.21 S.G. despite regular dumping of the shaker possum belly, so 150 bbls was dumped and replaced with new mud. The mud properties showed an immediate improvement with reduced gels of 2/8 and water loss down to 8.5 ccs at 2520m.

During this period the KCl percentage was gradually increased to 9-10% in response to the more dispersive nature of the clays, and it was generally maintained between 8-10% for the remainder of the well depending on supply.

Over the Christmas holiday period the mud temperature increased noticeably up to 60°C by 2700m on the 26th December. This increased temperature reduced the solids tolerance of the mud, and combined with a limited ability to dump due to limited polymer stocks, this resulted in markedly increased water loss (up to 27 ccs) and gel strengths (up to 4/24) over this period. The gel

.../Cont.

DISCUSSION BY INTERVAL (Cont.)

8½" Hole (Cont.)

strengths were somewhat controlled by the addition of several sacks of Lignosulphonate. With the end of most of the holidays and renewed polymer stocks the water loss and gels were reduced back to less than 13 ccs and 4/18 respectively, for the remainder of the section. It should be noted however that mud properties were no longer easily reduced to the levels earlier in the well, i.e. water loss 8-10 cc's and gels of less than 10.

All this points to the KCl/Polymer mud operating at close to the limits of its' clay solids tolerance, under the circulating temperatures that existed, especially when the mud weight exceeded 1.20 S.G. and the flow-line temperature reached 60°C. This situation was magnified by attempting to limit polymer consumption over the holiday period and also as T.D. was continually expected at any time.

Despite this, the caliper log, run at the final 3011m T.D. showed a good hole over the whole section with no significant deterioration in the upper section of the hole since it had been previously logged at 1773m. This result suggests that the greatest inhibiting effect is by far due to the KCl content of the mud rather than the polymer content. (It can be assumed that over the Christmas period with high water loss, that the mud had negligible free polymer table to act on the wellbore).

After logging at 2954m, drilled ahead until the final target depth at 2994m was reached where DST #3 was run and T.D. declared at 3011m. The well was then logged prior to plugging and abandoning.

DISCUSSION BY INTERVAL (Cont.)

CONCLUSIONS

The very slow drill rate over the majority of the 8½" hole suggests that all means should be attmepted to improve this, were another such well to be drilled.

From the mud point of view this means, that ways of achieving a significant reduction in drill solids and mud weight should be investigated. At the same time however the section is dispersive and as it is apparently the KCl % that does most of the inhibition, the KCl % should still be maintained at 8-10%.

There would be three basic approaches to achieving a significant solids content reduction:-

1. Increased dilution via increased dumping

2. Additional solids control equipment, namely a centrifuge, which would not be very economical or practical to rig up and have running efficiently with only one short well in mind.

3. A change of mud type to one which results in less dispersion or solids build up.

From an economics point of view, dumping and dilution is satisfactory only if a significant part of the dumped liquid can be recycled so that the KCl consumption can be minimised. KCl costs form a significant proportion of the final mud costs, and would be a higher proportion if dumping were increased. Also dumping without re-cycling would result in much higher water requirements and rig sump clean up costs.

CONCLUSIONS (Cont.)

Recylcing of the water from the mud will be far more efficient if a real settling agent/flocculant is used in the mud. The polyanionic polymers can be considered as partial flocculants, but there are other far more effective ones available (i.e. products such as BENEX or ALCOMER 1773).

For these reasons I believe that serious consideration should be given to using basically a clear water/flocculant/KCl system using these selective flocculants which will function in the KCl solution.

Viscosity and mud weight would then be controlled with additions of flocculants, and dumping mud, while pumping recycled water back in. Sufficient drill solids could be retained in the mud to provide enough viscosity for good hole cleaning in conjunction with the flocculant, while at the same time achieving a significant solids content reduction.

Fluid loss can still be controlled, but it should be done with colloidal type materials that do not interfere with the clay flocculation too much. No doubt best solids settling would be achieved without additional chemicals but some compromise might have to be settled on here. Fluid loss materials such as SODIUM POLYACRYLATE, starches should be considered, and they need not necessarily be used until the target section is approached.

There may be some loss of polymer inhibition in changing to such a system, but a flocculant chemical will still provide some inhibition of its' own. Also the recap of the 8½" hole section suggests that for several days drilling over the christmas period the mud did not have excess polymer anyway without any noticeable detrimental results. This suggests that we have sufficiently inhibited the hole with 8-10% KCl to consider a slight reduction in inhibtion as a trade-off for lower mud solids and possible increased drill rate.

/Cont

CONCLUSIONS (Cont.)

Mud chemical costs would be dramatically reduced, with the overall cost becoming negligible if drill rate was improved.

BAROID MATERIAL RECAP

COMPANY Beach Petroleum
LOCATION Heywood, Victoria
WELL Lindon #1
COST/DAY $581.48
COST/M $11.69
COST/M/DAY $5.84
COST/M³ $7.70
COST/M³/DAY $3.85

MUD TYPE Gel Flocculated with Lime
CONTRACTOR Richter Rig 14
DRILLING DAYS/PHASE 2
ROTATING HRS/PHASE 6.3/4
TOTAL DRILLING 99.5m
MUD CONSUMPTION FACTOR 9.5 bbl/m (1.5 m³/m)
DATE 2nd December, 1983

PHASE HOLE SIZE 17½"
INTERVAL TO 106m
FROM 6.5 RKB

MATERIAL	UNIT	COST UNIT	QUANTITY				TOTAL COST	
			ESTIMATE	KG/M³	ACTUAL	KG/M³	ESTIMATE	ACTUAL
AQUAGEL	100 lb	$13.50			75			$1,012.50
CAUSTIC POTASH	25 kg	26.45			1			26.45
LIME	25 kg	4.00			10			40.00
CALCIUM CHLORIDE	25 kg	14.00			6			84.00
DIESEL								
FRESH WATER m³								
SEA WATER					151			
TOTAL MUD MADE m³					157			
COST LESS BARYTES								
COST W/BARYTES								$1,162.95

COMMENTS Mud consumption includes volume used to maintain mud pit volume and also drill rathole and mousehole. Calcium Chloride used in cementing 13 3/8" casing.

BAROID MATERIAL RECAP

COMPANY Beach Petroleum
LOCATION Heywood, Victoria
WELL Lindon #1
COST/DAY $802.99
COST/M $4.32
COST/M/DAY $1.08
COST/M³ $14.87
COST/M³/DAY $3.72

MUD TYPE Gel/Lime/BENEX w/CMC-E.H.V. for logging
CONTRACTOR Richter
DRILLING DAYS/PHASE 4
ROTATING HRS/PHASE 38¼
TOTAL DRILLING 744m
MUD CONSUMPTION FACTOR 0.29 m³/m
DATE 6 December, 1983

PHASE HOLE SIZE 12¼"
INTERVAL TO 850m
FROM 106m

MATERIAL	UNIT	COST UNIT	QUANTITY ESTIMATE	QUANTITY KG/M³	QUANTITY ACTUAL	QUANTITY KG/M³	TOTAL COST ESTIMATE	TOTAL COST ACTUAL
AQUAGEL	100 lb	$13.50						
CAUSTIC POTASH	25 kg	26.45			105			$1,417.50
LIME	25 kg	4.00			1			26.45
BICARBONATE	40 kg	17.13			5			20.00
BARAPHOS	20 kg	79.00			2			34.26
ALCOMER 1773		210.00			2			158.00
CMC-E.H.V.	25 kg	55.50			2			420.00
CONDET	20 lt	20.50			5			277.50
AL. STEARATE	25 kg	75.52			6			123.00
SURFLO W300	20 lt	49.00			1			75.52
MAGCOBAR D-D	200 lt	610.71			1			49.00
					1			610.71
DIESEL								
FRESH WATER m³								
SEA WATER					216			
TOTAL MUD MADE m³								
COST LESS BARYTES					227			
COST W/BARYTES								
								$3,211.94

COMMENTS Volume used includes 111m³ (Est.) of water pumped into hole clearing out mud ring. Drilling detergents also used during this same period. CMC-E.H.V. added prior to logging to reduce water loss.

BAROID MATERIAL RECAP

COMPANY Beach Petroleum
LOCATION Heywood, Victoria
WELL Lindon #1
COST/DAY $1,460.80
COST/M $18.93
COST/M/DAY $0.68
COST/M³ $73.30
COST/M³/DAY $2.62

MUD TYPE KCl/Polymer
CONTRACTOR Richter
DRILLING DAYS/PHASE 28
ROTATING HRS/PHASE 426
TOTAL DRILLING 2161m
MUD CONSUMPTION FACTOR 0.23 m³/m (1.46 bbl/m)
DATE 3rd Janaury, 1984

PHASE HOLE SIZE 8½"
INTERVAL TO 3011m
FROM 850m

MATERIAL	UNIT	COST UNIT	QUANTITY				TOTAL COST	
			ESTIMATE	KG/M³	ACTUAL	KG/M³	ESTIMATE	ACTUAL
CELPOL	25 kg	$103.50			135			$13,972.50
XC POLYMER	50 lb	235.50			30			7,065.00
CELLOGEN		103.50			16			1,656.00
DRISPAC SUPERLO		103.50			14			1,449.00
CMC-E.H.V.	25 kg	55.50			25			1,387.50
BICARBONATE	40 kg	17.13			5			85.65
SODA ASH	40 kg	11.50			16			184.00
CAUSTIC POTASH	25 kg	26.45			18			476.10
CAUSTIC SODA	55 kg	58.19			9			523.71
CAUSTIC SODA	70 kg	74.06			2			148.12
AL. STEARATE	25 kg	75.52			2			151.04
SURFLO W300	20 lt	49.00			1			49.00
SPERSENE		13.40			16			214.40
MURIATE OF POTASH	50 kg	12.75			1062			13,540.50
DIESEL								
FRESH WATER m³					502			
SEA WATER								
TOTAL MUD MADE m³					558			
COST LESS BARYTES								
COST W/BARYTES								$40,902.52

COMMENTS Prices of CELLOGEN and DRISPAC taken as same as CELPOL. CAUSTIC SODA prices also taken as multiple of CAUSTIC POTACH price. This all done to simplify recap procedure. Water consumption does not include water used to drill out casing shoe and later dumped.

BAROID MATERIAL RECAP SUMMARY

COMPANY	Beach Petroleum	MUD TYPES Gel/LIME, Gel/LIME with BENEX & CMC, KCl-POLYMER	HOLE SIZE	AMOUNT HOLE DRILLING	DRILLING DAYS
LOCATION	Heywood, Victoria		17½"	99.5	2
WELL NAME	Lindon #1		12¼"	744	4
CONTRACTOR	Richter Rig 14		8½"	2161	28
COST/DAY	$1,331.54				
COST/M	$15.07				
COST/M/DAY	$0.44				
COST/M³	$48.06	TOTAL DEPTH 3011m			
COST/M³/DAY	$1.41	TOTAL ROTATING HRS. 464¼			
RECAPPED BY	M. Olejniczak	TOTAL DAYS ON HOLE 34	TOTAL	3004.5m	34
		DATE 3rd January, 1984	WELL AVERAGE		
		DATE OF RECAP 15 January, 84	MUD CONSUMPTION	0.31m³/m (1.97 bbl/m)	

MATERIALS	UNIT	COST UNIT	QUANTITY				TOTAL COST	
			ESTIMATE	KG/m³	ACTUAL	KG/m³	ESTIMATE	ACTUAL
AQUAGEL	100 lb	$13.50			180			$2,430.00
LIME	25 kg	4.00			15			60.00
CAUSTIC POTASH	25 kg	26.45			20			529.00
BICARBONATE	40 kg	17.13			7			119.91
BARAPHOS	20 kg	79.00			2			158.00
ALCOMER 1773		210.00			2			420.00
CMC-E.H.V.	25 kg	55.50			30			1,665.00
CONDET	20 lt	20.50			6			123.00
AL. STEARATE	25 kg	75.52			3			226.56
SURFLO W300	20 lt	49.00			2			98.00
MAGOBAR D-D	200 lt	610.71			1			610.71
CALCIUM CHLORIDE	25 kg	14.00			6			84.00
SODA ASH	40 kg	11.50			16			184.00
CELPOL	25 kg	103.50			135			13,972.50
XC POLYMER	50 lb	235.50			30			7,065.00
CELLOGEN		103.50			16			1,656.00
DRISPAC SURPERLO		103.50			14			1,449.00
CAUSTIC SODA	55 kg	58.19			9			523.71
CAUSTIC SODA	70 kg	74.06			2			148.12
SPERSENE		13.40			16			214.40
MURIATE OF POTASH	50 kg	12.75			1062			13,540.50
SALVAGE MUD								
DIESEL OIL								
FRESH WATER m³					869			
SEA WATER								
TOTAL MUD MADE m³					942			
COST LESS BARYTES								
COST WITH BARYTES								$45,272.41

COMMENTS This total well consumption is based om stocks left on site at the end of the well. Final materials cost may be higher due to damage in transit returning to Adelaide warehouse. Also costs of some items as stated before (ie CELLOGEN, DRISPAC, CAUSTIC) are comparative estimates only.

BARODIO DIVISION N.L. INDUSTRIES
DRILLING FLUID PROPERTY RECAP

Company Beach Petroleum
Well Lindon #1
Contractor/Rig Richter Rig 14

e 83	depth m.	hole size "	temp. °c.	wt. s.g.	vis. sec.	P.V.	Y.P.	gels 10 sec.	gels 10 min.	w.l. a.p.i	cake mm	w.l. hpht	°c	filtrate anal. pf	Cl.ppm	Ca.	sand %	retort anal.% oil	wat.	sol.	mbc kg/m³	PH	activity	forma
C.	106	17½"		1.04	35	4	16	7	12	NC					100	400	0.1					12	Spud in	Marl
	106	"		1.04	35	4	16	7	12	NC					100	400	0.1					12	Casing	-
3	109	12¼"		1.03	33	4	8	4	7	NC				2.0	100	600	0.1	-	97	3	-	12	Drill out	Marl
4	512	"		1.06	40	10	10	7	16	24	3			.2	100	TR	0.5	-	95	5	-	10.0	Drill	Marl Sand
5	850	"		1.07	47	14	16	10	25	13.4	2			.05	80	30	0.1	-	93	7	-	9.0	Drill	Sand Clay
6	850	"			PITS DUMPED AND CLEANED FOR NEW KCl/POLYMER MUD																			
7	850	"			MIXING NEW MUD																			
8	911.5	8½"		1.03	45	14	19	2	2	17.5	1			.25	22000	150	TR	-	98	2	-	10.0	Drill	Clay Sand
9	912.5	"		1.03	45	14	19	2	2	12.4	1			.2	23500	150	TR	-	98	2	-	10.0	Test	
10	927	"		1.04	42	17	13	2	2	10.4	1			.1	29000	150	TR	TR	98	2	-	9.5	Core, drill test	Sand
11	1174	"		1.04	43	17	15	2	2	10.0	1			.1	29000	150	TR	-	95	3	-	9.5	Drill	Clay w sand
12	1341	"		1.08	40	12	16	2	2	8.5	1			.05	34000	200	TR	-	91	6	-	9.0	Drill	Clay
13	1700	"		1.14	39	13	17	2	2	8.4	1			.02	34000	320	TR	-	91	6	-	9.0	Drill	Clay
14	1773	"		1.15	44	18	22	2	3	8.5	1			.02	34000	350	TR	-	90	6½	-	9.0	Drill Log	Clay
15	1904	"		1.16	39	13	16	2	2	8.2	1			0	42000	450	TR	-	90	6½	-	8.5	Log Drill	"

BAROID DIVISION N.L. INDUSTRIES
DRILLING FLUID PROPERTY RECAP

Company: Beach Petroleum
Well: Lindon #1
Contractor/Rig: Richter Rig 14

date 1983	depth m.	hole size "	temp. °C.	wt. s.g.	vis. sec.	P.V.	Y.P.	gels 10 sec	gels 10 min	w.l. a.p.i	cake mm	w.l. hpht	°C	filtrate anal. pf	Cl.ppm	Ca.	sand %	retort anal.% oil	wat.	sol.	mbc kg/m³	PH	activity	form
DEC. 16	2053	8½"		1.18	41	14	16	2	5	8.5	1			0.02	45500	300	TR	–	88½	7½	–	9.0	Drill	Clay
17	2156	"		1.20	40	10	20	2	6	8.4	1			.02	51000	200	TR	–	88	8	–	9.0	Drill	"
18	2226	"		1.20	39	11	15	2	5	8.5	2			.02	55000	180	TR	–	87	8	10	9.0	"	"
19	2316	"		1.20	44	12	17	2	8	9.6	2			.02	50500	200	TR	–	87	8	10	9.0	"	"
20	2395	"		1.20	40	12	16	4	14	10.0	2			.05	47500	220	TR	–	88	8	9.0	9.0	"	"
21	2440	"		1.20	42	13	19	5	20	9.5	2			.02	49000	80	TR	–	88	8	–	9.0	"	"
22	2507	"		1.18	37	13	14	2	8	8.5	2			.05	44500	40	TR	–	89	7	–	9.0	"	"
23	2578	"	56	1.20	41	15	15	2	20	8.0	2			1.5	42500	40	TR	–	88½	8	–	10.0	"	"
24	2619	"	56	1.19	41	12	16	3	16	14	3			.15	39000	40	TR	–	88½	8	–	9.0	"	"
25	2677	"	59	1.17	40	9	13	4	23	16	3			.02	42000	80	TR	–	90½	6	9	9.0	"	"
26	2745	"	60	1.19	42	12	18	4	18	18	3			.2	43000	40	TR	–	88½	8	9	10.0	"	"
27	2815	"	60	1.18	39	11	14	2	17	11.2	2			.02	40000	160	TR	–	90	7	10	9.0	"	"
28	2854	"	58	1.18	40	11	14	4	15	11	2			.02	38500	160	TR	–	90	7	8	9.0	"	"
29	2915	"	62	1.16	40	10	15	4	18	13.0	2			.02	36000	150	TR	–	90	7	8	9.0	"	"
30	2954	"	52	1.18	42	15	15	5	15	9.4	2			.02	50000	60	TR	–	89	7	–	9.0	"	"

BARODIO DIVISION N.L. INDUSTRIES
DRILLING FLUID PROPERTY RECAP

Company: Beach Petroleum
Well: Lindon #1
Contractor/Rig: Richter Rig 14

depth m.	hole size "	temp. °C.	wt. s.g.	vis. sec.	P.V.	Y.P.	gels 10 sec.	gels 10 min.	w.l. a.p.i	cake mm	w.l. hpht	°C	filtrate anal. pf	Cl.ppm	Ca.	sand %	retort anal.% oil	wat.	sol.	mbc kg/m³	PH	activity	forma
2962	8½"	59	1.18	40	11	16	2	14	9.4	2			.02	46500	100	TR	-	89	7	8	9.0	Log,drill	Clay
3011	"	-	1.18	41	11	18	3	18	10.0	2			.02	40000	60	TR	-	89	7	-	9.0	Drill	Clay Sand
3011	"	-	1.18	41	11	18	3	18	18.0	2			.02	40000	60	TR	-	89	7	-	9.0	Test, TD Log	Sand

BIT RECORD

COUNTRY	STATE	FIELD	LOCATION
AUSTRALIA	VICTORIA	WILDCAT	HEYWOOD

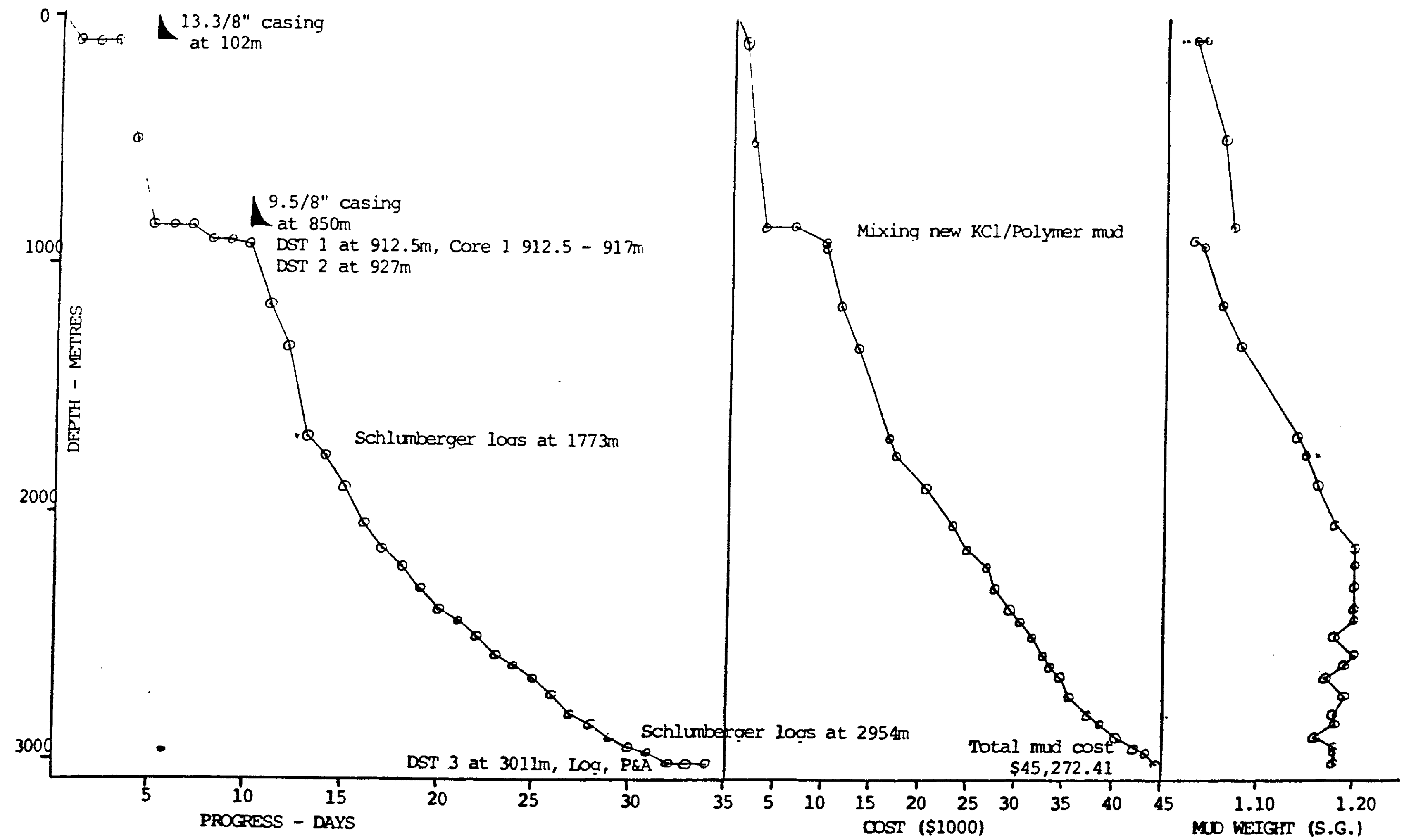
WELL	CONTRACTOR	RIG
LINDON #1	RICHTER DRILLING	14

OPERATOR	TOOL PUSHERS	SPUD	REACHED T.D.
BEACH PETROLEUM	B. WILLIAMS/B. GRINKER	1 DECEMBER 1983	1 JANUARY 1984

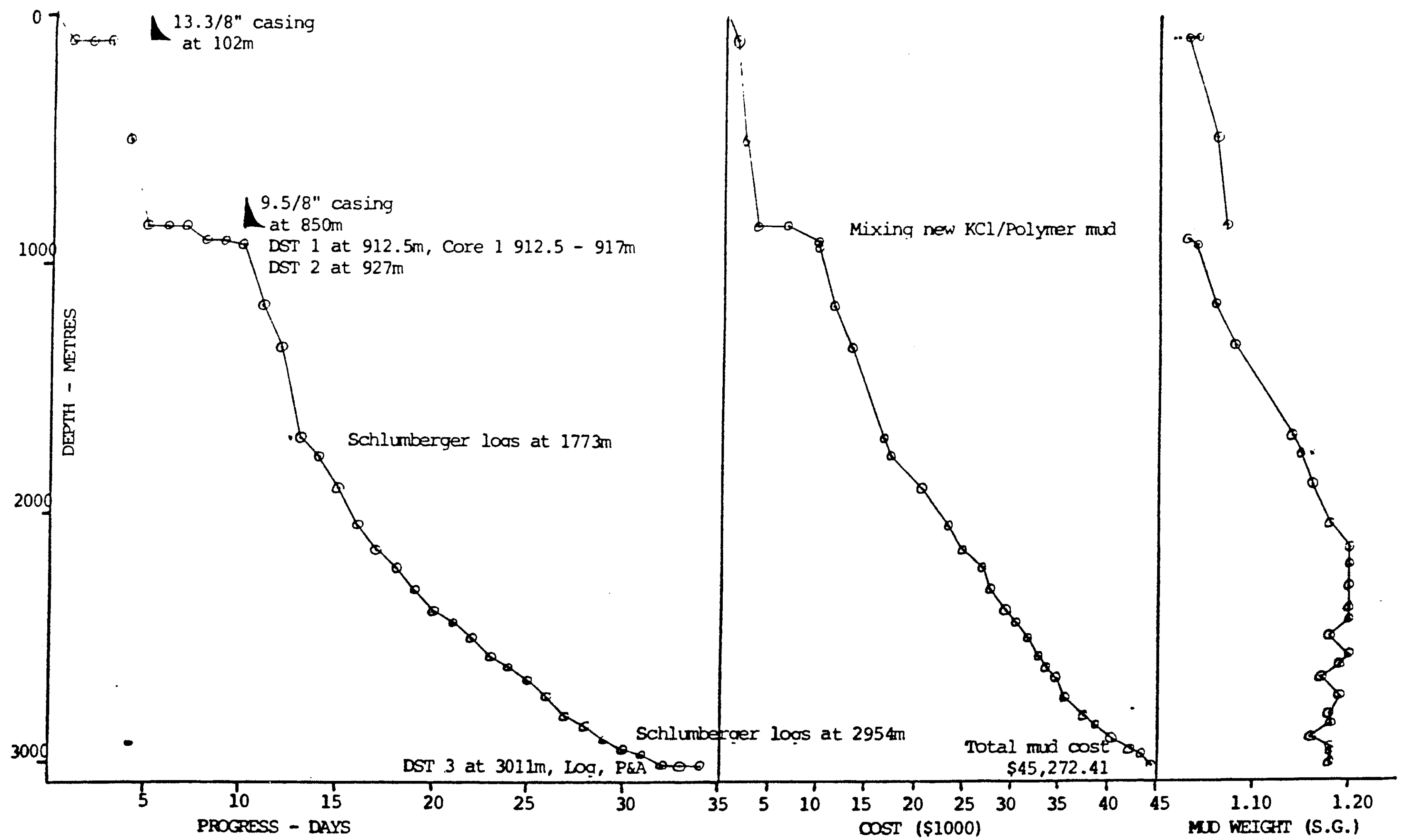
UNDER SURFACE	UNDER INTER.	PUMP NO.1 LINER	PUMP NO.2 LINER	PIPE / COLLARS	MUD
3011m RKB	2161m	6¼ x 9¼	6¼ x 9¼	4½" / 8"/6½"	F.W. GEL/KCl POLYMER

no.	size	make	type	jets 32nd	depth out(m)	mtrs.	hours	m/h	accum. drlg. hours	tonne wt.	rpm	ver. dev.	pump pres. psi.	spm 1	spm 2	mud wt.	mud vis.	mud w.l.	formation, remarks
RR 1	17½"	HTC	OSC3AJ	3 x 24	106	100	6.3/4	14.8	6.3/4	3-5	120		300	60	60	8.7	35	NC	Spud in
2	12¼"	HTC	J1	2 x 16 1 x 15	850	744	31½	23.6	38¼	16	120		1650	90	90	8.9	45	13.4	Sand w/occasional clay
3	8½"	HTC	J1	2 x 10 1 x 11	912.5	62.5	5½	11.4	43.3/4	10-16	120		1200	80	-	8.6	45	17.5	Clay w/some sand
C1	-	CHRIS	C18	-	917	4.5	2½	1.8	46¼	5-6	80		400	65	-	8.6	45	12.4	Tight sand w/oil
4	8½"	HTC	J3	3 x 9	927	10	½	20	46.3/4	5	60		1000	60	-	8.7	42	10.4	Drilled into sand for tes
RR 4	"	HTC	J3	3 x 9	1200	273	17¼	15.8	64.0	10-13	120		1550	73	-	8.8	42	9.5	Clay with sands
5	"	HTC	J22	3 x 9	1773	573	39¼	14.6	103¼	16	65		1725	76	-	9.5	39	8.4	Predominantly claystone
6	"	HTC	J22	2 x 9 1 x 11	2196	423	79½	5.3	182.3/4	16	70		1875	62	-	10.0	39	8.5	" "
7	"	HTC	J11	2 x 9 1 x 11	2431	235	65¼	3.6	248	17	70		1675	76	-	10.0	42	9.5	" "
RR 8	"	HTC	J22	" "	2619	1188	70	2.7	318	17	70		1750	76	-	10.0	39	8.5	" "
9	"	HTC	J22	" "	2830	211	74	2.85	392	15	70		1750	76	-	9.9	42	14-27	" "
10	"	HTC	J22	" "	2954	124	50	2.5	442	15	70		1650	76	-	9.8+	42	9.4	Claystone with sand break.

BEACH PETROLEUM - LINDON #1



BEACH PETROLEUM - LINDON #1



APPENDIX 6

DRILLING FLUID RECAP

BEACH PETROLEUM

DRILLING FLUID RECAP FOR

LINDON #1

Prepared by: M. Olejniczak

January 25, 1984

TABLE OF CONTENTS

BEACH PETROLEUM

LINDON #1

INTRODUCTION

The Lindon #1 well was quite successfully drilled without any significant, delay causing problems, using Gel based muds in the 17½" and 12¼" hole sections and a KCl/Polymer in the 8½" hole.

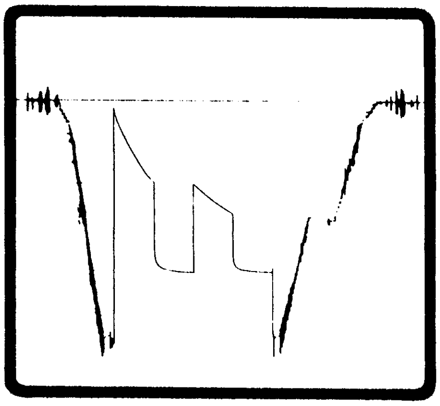
It differed from previous wells, which had used KCl/Polymer, in having a much longer, more uniform Eumerella Formation sequence with very slow drill rates over a large part of the hole. Also the KCl/Polymer mud during this section showed signs of being at close to the limits of its' effective performance, without resulting in any hole problems.

This suggests that means should be looked at to improve both the drill rate and the mud performance.

APPENDIX 7

DRILL STEM TEST RESULTS

FORMATION TESTING SERVICE REPORT



HALLIBURTON SERVICES

Duncan, Oklahoma 73536

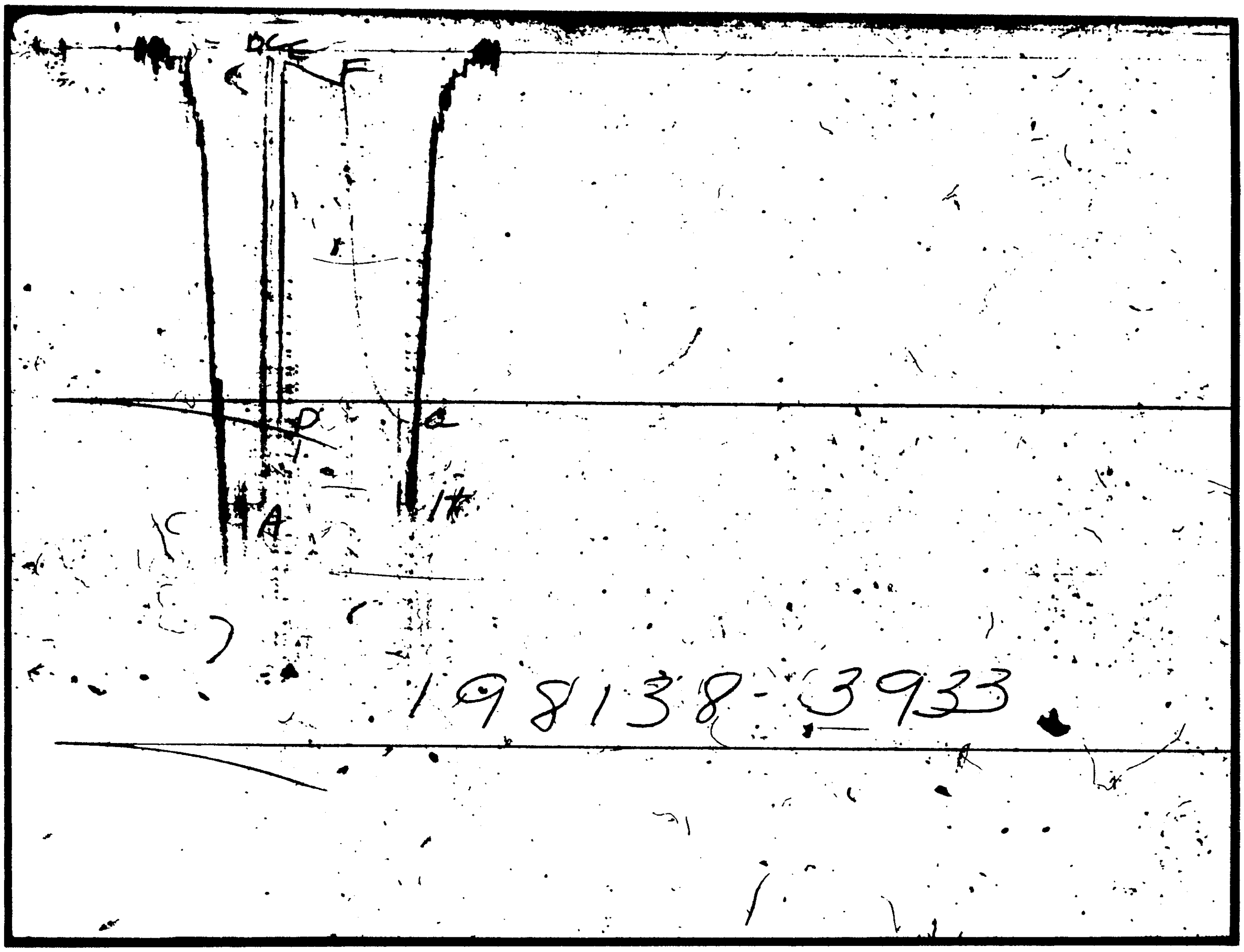
A Halliburton Company

HALLIBURTON SERVICES

TICKET NO. 19813800
11-JAN-84
ADELAIDE

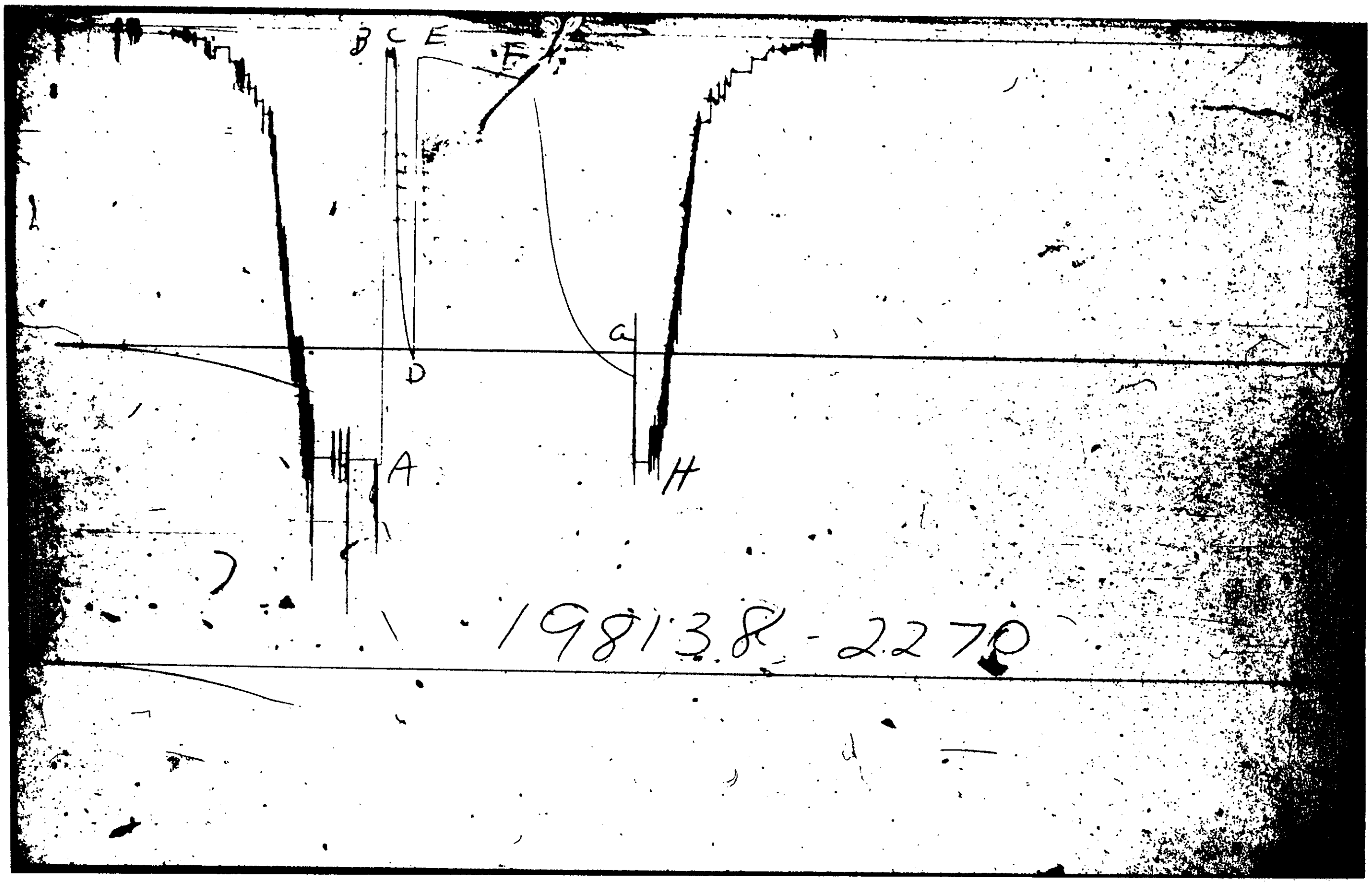
FORMATION TESTING SERVICE REPORT

LEASE NAME: HAYWOOD
WELL NO.
TEST NO.
TESTED INTERVAL
LEASE OWNER/COMPANY NAME
LEGAL LOCATION SEC. - TWP. - RNG.
FIELD AREA: HAYWOOD
COUNTY: VICTORIA
STATE: AUSTRALIA SM



GAUGE NO: 3933 DEPTH: 2903.0 BLANKED OFF: NO HOUR OF CLOCK: 48

ID	DESCRIPTION	PRESSURE REPORTED	PRESSURE CALCULATED	TIME REPORTED	TIME CALCULATED	TYPE
A	INITIAL HYDROSTATIC	1310	1312.6			
B	INITIAL FIRST FLOW	25	18.7	10.0	10.4	F
C	FINAL FIRST FLOW	33	25.8			
C	INITIAL FIRST CLOSED-IN	33	25.8	24.0	23.9	C
D	FINAL FIRST CLOSED-IN	1068	990.7			
E	INITIAL SECOND FLOW	42	32.9	119.0	120.4	F
F	FINAL SECOND FLOW	100	101.6			
F	INITIAL SECOND CLOSED-IN	100	101.6	120.0	118.4	C
G	FINAL SECOND CLOSED-IN	1051	1053.1			
H	FINAL HYDROSTATIC	1310	1308.3			



GAUGE NO: 2270 DEPTH: 2988.0 BLANKED OFF: YES HOUR OF CLOCK: 24

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC	1352	1355.8			
B	INITIAL FIRST FLOW	59	68.5	10.0	10.4	F
C	FINAL FIRST FLOW	67	85.8			
C	INITIAL FIRST CLOSED-IN	67	85.8	24.0	23.9	C
D	FINAL FIRST CLOSED-IN	1040	1039.0			
E	INITIAL SECOND FLOW	84	91.1	119.0	120.4	F
F	FINAL SECOND FLOW	151	149.6			
F	INITIAL SECOND CLOSED-IN	151	149.6	120.0	118.4	C
G	FINAL SECOND CLOSED-IN	1082	1080.9			
H	FINAL HYDROSTATIC	1352	1349.1			

EQUIPMENT & HOLE DATA

FORMATION TESTED: PEBBIE POINT
NET PAY (ft):
GROSS TESTED FOOTAGE: 68.0
ALL DEPTHS MEASURED FROM: KELLY BUSHING
CASING PERFS. (ft):
HOLE OR CASING SIZE (in): 8.500
ELEVATION (ft): 69
TOTAL DEPTH (ft): 2991.0
PACKER DEPTH(S) (ft): 2917, 2923
FINAL SURFACE CHOKE (in): 0.500
BOTTOM HOLE CHOKE (in): 0.750
MUD WEIGHT (lb/gal): 9.60
MUD VISCOSITY (sec): 35
ESTIMATED HOLE TEMP. (°F): 100
ACTUAL HOLE TEMP. (°F): 110 @ 2987.0 ft

TICKET NUMBER: 19813800

DATE: 12-9-83 TEST NO: 1

TYPE DST: OPEN HOLE

HALLIBURTON CAMP: ADELAIDE

TESTER: D. HUNT
A. NICHOLS

WITNESS: J.E. OZOLINS

DRILLING CONTRACTOR: RICHTER #14

FLUID PROPERTIES FOR RECOVERED MUD & WATER

SOURCE	RESISTIVITY	CHLORIDES
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm

SAMPLER DATA

Psig AT SURFACE:
cu.ft. OF GAS:
cc OF OIL:
cc OF WATER:
cc OF MUD:
TOTAL LIQUID cc:

HYDROCARBON PROPERTIES

OIL GRAVITY (°API): @ °F
GAS/OIL RATIO (cu.ft. per bbl):
GAS GRAVITY:

CUSHION DATA

TYPE	AMOUNT	WEIGHT

RECOVERED:

60 FEET OF OIL AND GAS CUT MUD
90 FEET OF GAS CUT MUD
60 FEET OF MUD

MEASURED FROM TESTER VALVE

REMARKS:

GROUND LEVEL IS AT 63.3 METERS.

ALL READINGS ON BT 3933 SHOULD BE CONSIDERED HIGHLY QUESTIONABLE DUE TO SPLIT STYLUS POINT.

TYPE & SIZE MEASURING DEVICE: .50" CHOKE MANIFOLD

TICKET NO: 19813800

TIME	CHOKE SIZE	SURFACE PRESSURE PSI	GAS RATE MCF	LIQUID RATE BPD	REMARKS
12-9-83					
0230					MADE UP TOOLS
0400					RAN IN HOLE WITH TEST TOOLS
0625					PICKED UP HEAD
0723					SET PACKER
0727					TOOL OPENED - ANNULUS FULL.
					WEAK BLOW.
0732	BH				VERY WEAK BLOW
0735					BLOW STOPPED
0737					CLOSED TOOL
0801					TOOL OPENED WITH WEAK BLOW
0806					BLOW INCREASING SLOWLY
0821					BLOW INCREASING
0826					BLOW SLIGHTLY INCREASING
0836					BLOW STOPPED
0844					BLOW INCREASING
0850					BLOW STEADY
0914					SAME
0930					SAME
0945					SAME
1000					CLOSED TOOL
1200					PULLED PACKERS FREE, OPENED
					BYPASS
1230					LAID TEST HEAD DOWN
1235					PULLED OUT OF HOLE WITH TEST
					TOOLS
1400					OUT OF HOLE WITH TOOLS.

TESTER VALVE

TICKET NO: 19813800		GAUGE NO: 3933
CLOCK NO: 7273	HOUR: 48	DEPTH: 2903.0

HALLIBURTON SERVICES

REF		MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t + \Delta t}$	$\log \frac{t+\Delta t}{\Delta t}$
FIRST FLOW						
B	1	0.0	18.7			
C	2	10.4	25.8	7.1		
FIRST CLOSED-IN						
C	1	0.0	25.8			
	2	1.0	652.1	626.2	0.9	1.066
	3	2.0	686.9	661.0	1.7	0.788
	4	3.0	737.1	711.3	2.3	0.649
	5	4.0	768.6	742.7	2.9	0.558
	6	5.0	796.4	770.6	3.4	0.487
	7	6.0	819.8	794.0	3.8	0.436
	8	7.0	833.6	807.8	4.2	0.396
	9	8.0	849.7	823.8	4.5	0.361
	10	9.0	867.2	841.4	4.8	0.333
	11	10.0	885.1	859.3	5.1	0.308
	12	12.0	911.6	885.8	5.5	0.271
	13	14.0	938.4	912.5	5.9	0.241
	14	16.0	955.4	929.6	6.3	0.217
	15	18.0	975.0	949.1	6.6	0.197
	16	20.0	989.4	963.6	6.8	0.181
	17	22.0	989.6	963.8	7.0	0.168
D	18	23.9	990.7	964.8	7.2	0.157
SECOND FLOW						
E	1	0.0	32.9			
	2	20.0	40.8	7.9		
	3	40.0	54.3	13.5		
	4	60.0	68.6	14.2		
	5	80.0	80.2	11.6		
	6	100.0	91.8	11.6		
F	7	120.4	101.6	9.8		
SECOND CLOSED-IN						
F	1	0.0	101.6			
	2	1.0	108.1	6.5	1.0	2.128
	3	2.0	118.6	17.0	2.0	1.817
	4	3.0	127.1	25.5	2.9	1.648
	5	4.0	137.5	35.9	3.9	1.522
	6	5.0	146.9	45.3	4.8	1.436
	7	6.0	158.9	57.3	5.7	1.357
	8	7.0	175.1	73.5	6.6	1.294
	9	8.0	191.9	90.3	7.6	1.237
	10	9.0	207.4	105.8	8.4	1.193
	11	10.0	224.1	122.5	9.3	1.148
	12	12.0	271.2	169.6	11.0	1.077
	13	14.0	325.8	224.2	12.6	1.015

REF		MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t + \Delta t}$	$\log \frac{t+\Delta t}{\Delta t}$
SECOND CLOSED-IN - CONTINUED						
	14	16.0	396.3	294.7	14.2	0.964
	15	18.0	467.7	366.1	15.8	0.918
	16	20.0	523.3	421.7	17.3	0.877
	17	22.0	567.0	465.4	18.8	0.842
	18	24.0	610.1	508.6	20.3	0.810
	19	26.0	649.8	548.2	21.7	0.781
	20	28.0	690.8	589.3	23.1	0.753
	21	30.0	716.1	614.5	24.4	0.729
	22	35.0	772.5	671.0	27.6	0.676
	23	40.0	816.6	715.1	30.6	0.630
	24	45.0	857.2	755.6	33.5	0.592
	25	50.0	887.5	785.9	36.2	0.558
	26	55.0	908.5	806.9	38.7	0.528
	27	60.0	930.9	829.3	41.1	0.502
	28	70.0	964.7	863.1	45.6	0.457
	29	80.0	991.3	889.8	49.6	0.421
	30	90.0	1013.7	912.1	53.3	0.390
	31	100.0	1031.3	929.7	56.7	0.363
	32	110.0	1044.1	942.5	59.7	0.340
G	33	118.4	1053.1	951.5	62.1	0.323

REMARKS:
ALL READINGS SHOULD BE CONSIDERED HIGHLY QUESTIONABLE DUE TO SPLIT STYLUS.

TICKET NO: 19813800

CLOCK NO: 30347 HOUR: 24

HALLIBURTON SERVICES

GAUGE NO: 2270

DEPTH: 2988.0

FIRST FLOW

REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t+\Delta t}$	$\log \frac{t+\Delta t}{\Delta t}$
B 1	0.0	68.5			
C 2	10.4	85.8	17.3		

FIRST CLOSED-IN

REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t+\Delta t}$	$\log \frac{t+\Delta t}{\Delta t}$
C 1	0.0	85.8			
2	1.0	218.6	132.8	0.9	1.062
3	2.0	321.6	235.7	1.7	0.797
4	3.0	427.1	341.3	2.3	0.648
5	4.0	511.1	425.2	2.9	0.556
6	5.0	630.1	544.2	3.4	0.489
7	6.0	678.5	592.7	3.8	0.436
8	7.0	730.4	644.6	4.2	0.394
9	8.0	759.4	673.6	4.5	0.361
10	9.0	798.7	712.9	4.8	0.331
11	10.0	826.0	740.1	5.1	0.309
12	12.0	883.4	797.6	5.6	0.270
13	14.0	919.6	833.8	6.0	0.240
14	16.0	955.4	869.5	6.3	0.217
15	18.0	984.0	898.2	6.6	0.197
16	20.0	1004.8	919.0	6.8	0.181
17	22.0	1023.7	937.9	7.0	0.168
D 18	23.9	1039.0	953.2	7.2	0.157

SECOND FLOW

REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t+\Delta t}$	$\log \frac{t+\Delta t}{\Delta t}$
E 1	0.0	91.1			
2	20.0	87.0	-4.1		
3	40.0	99.6	12.6		
4	60.0	115.4	15.9		
5	80.0	127.8	12.3		
6	100.0	139.5	11.7		
F 7	120.4	149.6	10.1		

SECOND CLOSED-IN

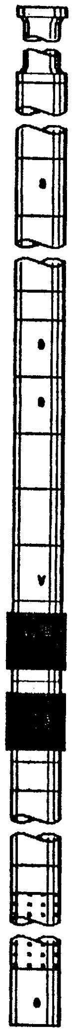
REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t+\Delta t}$	$\log \frac{t+\Delta t}{\Delta t}$
F 1	0.0	149.6			
2	1.0	156.7	7.1	1.0	2.102
3	2.0	164.9	15.4	2.0	1.817
4	3.0	172.5	22.9	2.9	1.653
5	4.0	182.3	32.7	3.9	1.526
6	5.0	195.3	45.7	4.8	1.434
7	6.0	209.8	60.2	5.8	1.355
8	7.0	220.4	70.8	6.6	1.296
9	8.0	233.1	83.6	7.5	1.239
10	9.0	248.1	98.5	8.5	1.189
11	10.0	262.7	113.1	9.3	1.147
12	12.0	301.3	151.8	11.0	1.075
13	14.0	338.3	188.7	12.7	1.013

SECOND CLOSED-IN - CONTINUED

REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t+\Delta t}$	$\log \frac{t+\Delta t}{\Delta t}$
14	16.0	391.6	242.0	14.3	0.962
15	18.0	443.5	293.9	15.8	0.917
16	20.0	497.1	347.6	17.4	0.877
17	22.0	556.2	406.6	18.8	0.841
18	24.0	595.2	445.6	20.3	0.809
19	26.0	639.5	490.0	21.7	0.781
20	28.0	674.0	524.4	23.1	0.753
21	30.0	706.6	557.0	24.4	0.728
22	35.0	766.2	616.6	27.6	0.675
23	40.0	815.9	666.3	30.6	0.630
24	45.0	857.3	707.7	33.5	0.592
25	50.0	894.1	744.6	36.2	0.558
26	55.0	921.9	772.3	38.7	0.528
27	60.0	948.1	798.5	41.1	0.502
28	70.0	987.1	837.5	45.6	0.457
29	80.0	1014.4	864.8	49.6	0.421
30	90.0	1038.0	888.4	53.3	0.390
31	100.0	1056.2	906.6	56.7	0.363
32	110.0	1070.2	920.7	59.7	0.340
G 33	118.4	1080.9	931.4	62.1	0.323

REMARKS:

TICKET NO. 19813800



		O.D.	I.D.	LENGTH	DEPTH
1	DRILL PIPE......................			2372.0	
3	DRILL COLLARS..................			454.9	
50	IMPACT REVERSING SUB...........	5.500	2.400	1.0	
3	DRILL COLLARS..................			61.1	
5	CROSSOVER......................	5.200	2.500	1.8	
12	DUAL CIP VALVE.................	5.000	0.870	5.1	
60	HYDROSPRING TESTER.............	5.000	0.750	5.0	2900.9
80	AP RUNNING CASE................	5.000	3.060	4.2	2903.0
15	JAR............................	5.030	1.750	5.0	
16	VR SAFETY JOINT................	5.000	1.000	2.4	
70	OPEN HOLE PACKER...............	6.000	1.680	6.0	2917.0
70	OPEN HOLE PACKER...............	6.000	1.680	6.0	2923.0
5	CROSSOVER......................	5.200	2.000	0.7	
3	DRILL COLLARS..................			30.0	
5	CROSSOVER......................	5.200	2.000	0.9	
20	FLUSH JOINT ANCHOR.............	5.000	2.370	30.0	
81	BLANKED-OFF RUNNING CASE.......	5.000		4.1	2988.0
	TOTAL DEPTH				2991.0

EQUIPMENT DATA

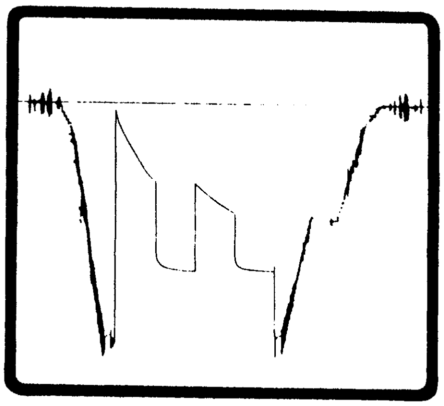
EQUATIONS FOR DST LIQUID WELL ANALYSIS

Transmissibility	$\frac{kh}{\mu} = \frac{162.6\ QB}{m}$	$\frac{\text{md-ft}}{\text{cp}}$
Indicated Flow Capacity	$kh = \frac{kh}{\mu}\ \mu$	md-ft
Average Effective Permeability	$k = \frac{kh}{h}$	md
Damage Ratio	$DR = .183\ \frac{P^* - P_f}{m}$	—
Theoretical Potential w / Damage Removed	$Q_1 = Q\ DR$	BPD
Approx. Radius of Investigation	$r_i = 4.63 \sqrt{kt}$	ft

EQUATIONS FOR DST GAS WELL ANALYSIS

Indicated Flow Capacity	$kh = \frac{1637\ Q_g\ T}{m}$	md-ft
Average Effective Permeability	$k = \frac{kh}{h}$	md
Skin Factor	$S = 1.151 \left[\frac{m(P^*) - m(P_f)}{m} - \text{LOG}\ \frac{kt}{\phi\ \mu\ c_t r_w^2} + 3.23 \right]$	—
Damage Ratio	$DR = \frac{m(P^*) - m(P_f)}{m(P^*) - m(P_f) - 0.87\ mS}$	—
Indicated Flow Rate (Maximum)	$AOF_1 = \frac{Q_g\ m(P^*)}{m(P^*) - m(P_f)}$	MCFD
Indicated Flow Rate (Minimum)	$AOF_2 = Q_g \sqrt{\frac{m(P^*)}{m(P^*) - m(P_f)}}$	MCFD
Approx. Radius of Investigation	$r_i = 0.032 \sqrt{\frac{kt}{\phi \mu c_t}}$	ft

FORMATION TESTING SERVICE REPORT



20 JAN 1984

HALLIBURTON SERVICES

Duncan, Oklahoma 73536

A Halliburton Company

HALLIBURTON
SERVICES

TICKET NO. 19813900
11-JAN-84
ADELAIDE

FORMATION TESTING SERVICE REPORT

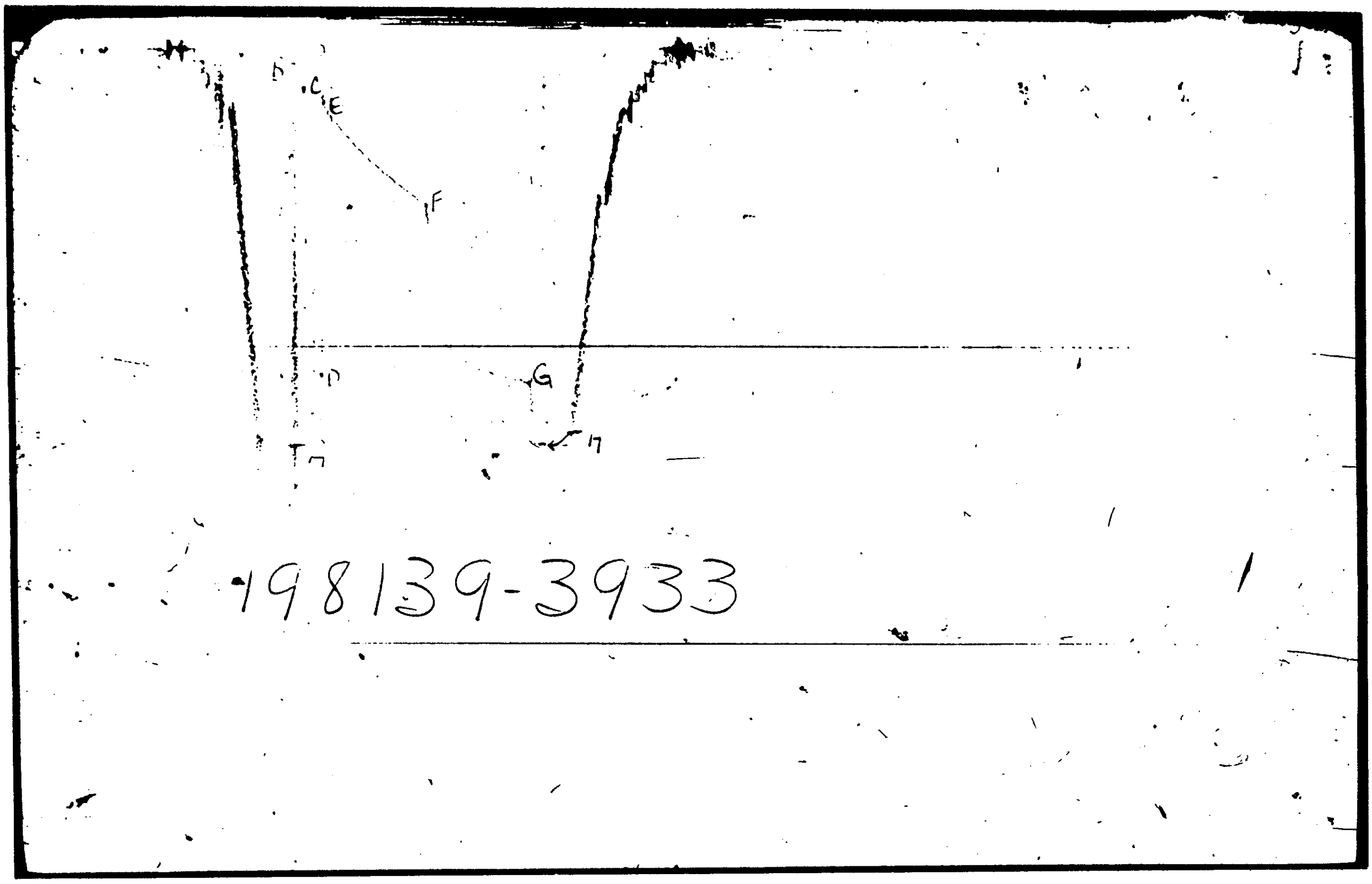
LEASE NAME | WELL NO. | TEST NO. | TESTED INTERVAL | LEASE OWNER/COMPANY NAME

LEGAL LOCATION SEC. - TWP. - RNG. HAYWOOD

FIELD AREA HAYWOOD

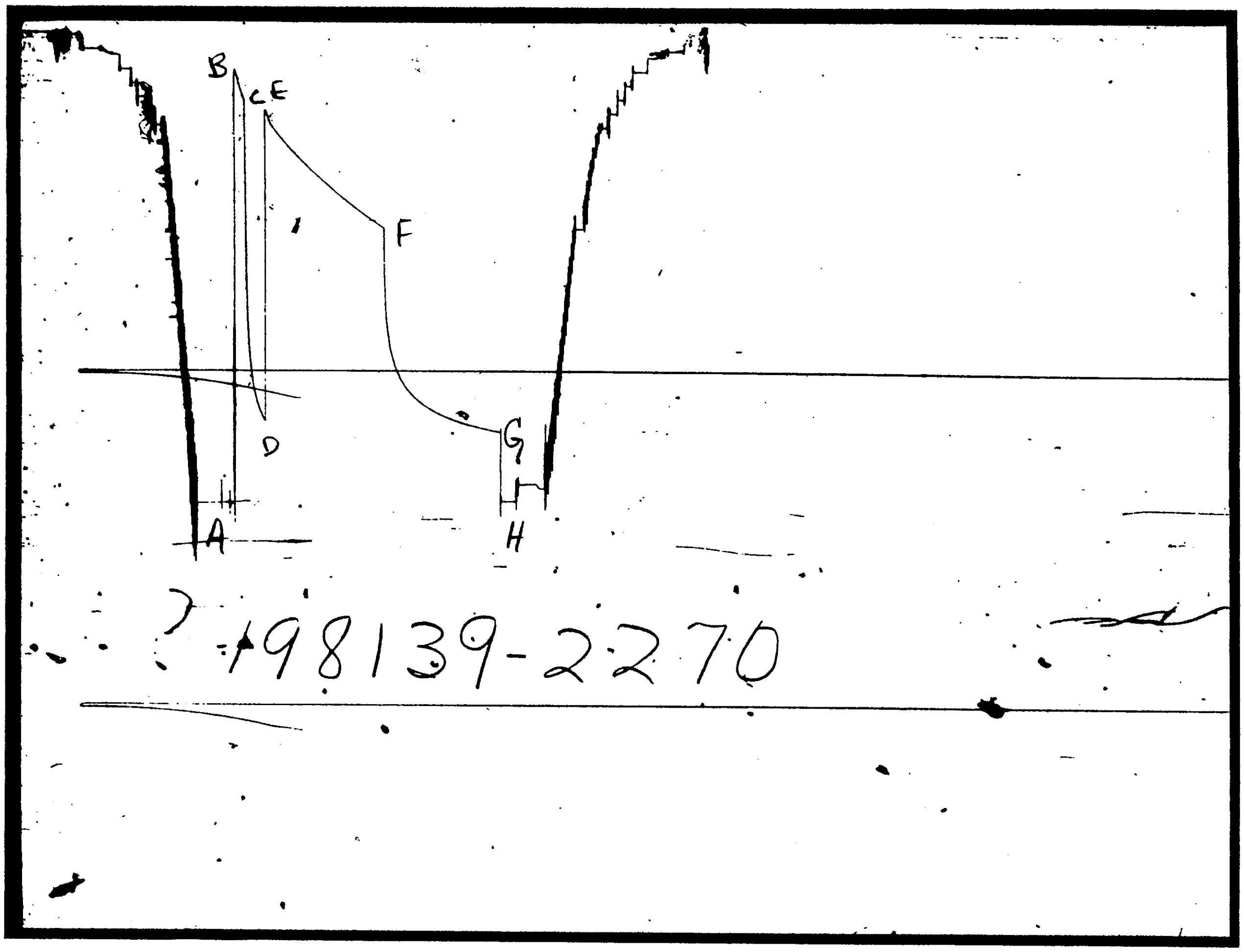
COUNTY VICTORIA

STATE AUSTRALIA BC



GAUGE NO: 3933 DEPTH: 2892.0 BLANKED OFF: NO HOUR OF CLOCK: 24

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC	1319	1312.7			
B	INITIAL FIRST FLOW	8	46.6	10.0	10.6	F
C	FINAL FIRST FLOW	134	133.4			
C	INITIAL FIRST CLOSED-IN	134	133.4	20.0	20.2	C
D	FINAL FIRST CLOSED-IN	1084	1075.3			
E	INITIAL SECOND FLOW	151	147.2	121.0	122.0	F
F	FINAL SECOND FLOW	518	521.4			
F	INITIAL SECOND CLOSED-IN	518	521.4	120.0	118.8	C
G	FINAL SECOND CLOSED-IN	1118	1119.1			
H	FINAL HYDROSTATIC	1319	1300.3			



GAUGE NO: 2270 DEPTH: 3038.0 BLANKED OFF: YES HOUR OF CLOCK: 24

ID	DESCRIPTION	PRESSURE REPORTED	PRESSURE CALCULATED	TIME REPORTED	TIME CALCULATED	TYPE
A	INITIAL HYDROSTATIC	1368	1383.4			
B	INITIAL FIRST FLOW	101	108.0	10.0	10.6	F
C	FINAL FIRST FLOW	193	199.3			
C	INITIAL FIRST CLOSED-IN	193	199.3	20.0	20.2	C
D	FINAL FIRST CLOSED-IN	1149	1142.5			
E	INITIAL SECOND FLOW	235	227.9	121.0	122.0	F
F	FINAL SECOND FLOW	570	575.5			
F	INITIAL SECOND CLOSED-IN	570	575.5	120.0	118.8	C
G	FINAL SECOND CLOSED-IN	1166	1174.5			
H	FINAL HYDROSTATIC	1368	1378.6			

EQUIPMENT & HOLE DATA

FORMATION TESTED: PEBBIE POINT
NET PAY (ft):
GROSS TESTED FOOTAGE: 129.0
ALL DEPTHS MEASURED FROM: KB
CASING PERFS. (ft):
HOLE OR CASING SIZE (in): 8.500
ELEVATION (ft): 69
TOTAL DEPTH (ft): 3041.0
PACKER DEPTH(S) (ft): 2906, 2912
FINAL SURFACE CHOKE (in): 0.500
BOTTOM HOLE CHOKE (in): 0.750
MUD WEIGHT (lb/gal): 8.60
MUD VISCOSITY (sec): 35
ESTIMATED HOLE TEMP. (°F): 110
ACTUAL HOLE TEMP. (°F): 110 @ 3037.0 ft

TICKET NUMBER: 19813900
DATE: 12-11-83 TEST NO: 2
TYPE DST: OPEN HOLE
HALLIBURTON CAMP: ADELAIDE
TESTER: HUNT NICHOLS
WITNESS: OZOLIN ???
DRILLING CONTRACTOR: RICHTER #14

FLUID PROPERTIES FOR RECOVERED MUD & WATER

SOURCE	RESISTIVITY	CHLORIDES
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm

SAMPLER DATA

Psig AT SURFACE:
cu.ft. OF GAS:
cc OF OIL:
cc OF WATER:
cc OF MUD:
TOTAL LIQUID cc:

HYDROCARBON PROPERTIES

OIL GRAVITY (°API): @ °F
GAS/OIL RATIO (cu.ft. per bbl):
GAS GRAVITY:

CUSHION DATA

TYPE	AMOUNT	WEIGHT

RECOVERED:

1200' OF MUDDY WATER

MEASURED FROM TESTER VALVE

REMARKS:

GROUND LEVEL IS AT 63.3 METERS.
ALL READINGS ON B.T. #3933 ARE HIGHLY QUESTIONABLE.

TYPE & SIZE MEASURING DEVICE: .50" CHOKE - MANIFOLD

TICKET NO: 19813900

TIME	CHOKE SIZE	SURFACE PRESSURE PSI	GAS RATE MCF	LIQUID RATE BPD	REMARKS
12-10-83					
1530					PICKED UP TEST TOOLS
1621					RAN IN HOLE WITH TOOLS
1746					TAGGED BOTTOM
1800					PICKED UP TEST HEAD
1825					SET PACKER
1829					TOOL OPENED WITH A GOOD BLOW
1834					INCREASING
1839					CLOSED TOOL
1859					OPENED TOOL WITH A MEDIUM BLOW
1904					BLOW STEADY THROUGHOUT PERIOD
2100					CLOSED TOOL
2300					PULLED PACKER FREE AND OPENED
					BY-PASS
2315					LAID TEST HEAD DOWN
2330					PULLED OUT OF HOLE WITH TOOLS
12-11-83					
0100					OUT OF HOLE WITH TOOLS.

TICKET NO: 19813900
CLOCK NO: 30347 HOUR: 24

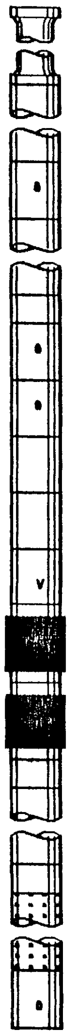
HALLIBURTON
SERVICES

GAUGE NO: 2270
DEPTH: 3038.0

REF		MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t+\Delta t}$	$\log \frac{t+\Delta t}{\Delta t}$
		FIRST FLOW				
B	1	0.0	108.0			
	2	2.0	117.6	9.6		
	3	4.0	142.5	24.9		
	4	6.0	163.1	20.6		
	5	8.0	178.9	15.8		
C	6	10.6	199.3	20.5		
		FIRST CLOSED-IN				
C	1	0.0	199.3			
	2	1.0	542.4	343.0	0.9	1.084
	3	2.0	762.9	563.6	1.7	0.806
	4	3.0	859.9	660.6	2.3	0.662
	5	4.0	918.8	719.5	2.9	0.561
	6	5.0	956.9	757.5	3.4	0.496
	7	6.0	986.7	787.4	3.8	0.441
	8	7.0	1009.5	810.2	4.2	0.402
	9	8.0	1031.5	832.1	4.6	0.368
	10	9.0	1050.8	851.4	4.9	0.339
	11	10.0	1062.9	863.6	5.2	0.314
	12	12.0	1084.9	885.6	5.6	0.276
	13	14.0	1105.2	905.9	6.0	0.245
	14	16.0	1119.8	920.5	6.4	0.221
	15	18.0	1131.4	932.0	6.7	0.202
D	16	20.2	1142.5	943.2	7.0	0.184
		SECOND FLOW				
E	1	0.0	227.9			
	2	10.0	284.6	56.6		
	3	20.0	319.7	35.2		
	4	30.0	352.4	32.7		
	5	40.0	382.5	30.0		
	6	50.0	410.8	28.4		
	7	60.0	437.2	26.4		
	8	70.0	462.7	25.4		
	9	80.0	486.8	24.2		
	10	90.0	509.9	23.1		
	11	100.0	531.9	22.0		
	12	110.0	552.9	21.0		
	13	120.0	571.9	19.0		
F	14	122.0	575.5	3.6		
		SECOND CLOSED-IN				
F	1	0.0	575.5			
	2	1.0	786.5	211.0	1.0	2.133
	3	2.0	838.4	262.9	2.0	1.828
	4	3.0	869.5	294.0	2.9	1.662

REF		MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t+\Delta t}$	$\log \frac{t+\Delta t}{\Delta t}$
		SECOND CLOSED-IN - CONTINUED				
	5	4.0	892.8	317.3	3.9	1.534
	6	5.0	914.0	338.4	4.8	1.439
	7	6.0	928.9	353.4	5.7	1.366
	8	7.0	942.2	366.7	6.6	1.303
	9	8.0	954.7	379.1	7.5	1.245
	10	9.0	964.1	388.5	8.5	1.195
	11	10.0	972.9	397.3	9.3	1.156
	12	12.0	990.1	414.6	11.0	1.081
	13	14.0	1003.0	427.4	12.7	1.020
	14	16.0	1015.3	439.8	14.3	0.968
	15	18.0	1025.8	450.3	15.9	0.922
	16	20.0	1034.8	459.3	17.4	0.883
	17	22.0	1044.1	468.6	18.9	0.847
	18	24.0	1051.5	476.0	20.3	0.815
	19	26.0	1058.8	483.2	21.8	0.785
	20	28.0	1065.3	489.8	23.2	0.758
	21	30.0	1070.6	495.0	24.4	0.735
	22	35.0	1083.6	508.1	27.7	0.681
	23	40.0	1094.9	519.3	30.7	0.635
	24	45.0	1104.6	529.1	33.6	0.596
	25	50.0	1113.0	537.4	36.3	0.563
	26	55.0	1120.7	545.2	38.9	0.533
	27	60.0	1127.7	552.1	41.3	0.507
	28	70.0	1139.0	563.5	45.8	0.462
	29	80.0	1148.6	573.0	49.9	0.425
	30	90.0	1156.9	581.4	53.6	0.393
	31	100.0	1163.6	588.0	57.0	0.367
	32	110.0	1169.9	594.4	60.1	0.344
G	33	118.8	1174.5	598.9	62.7	0.326

REMARKS:



		O.D.	I.D.	LENGTH	DEPTH
1	DRILL PIPE			2423.0	
3	DRILL COLLARS			364.3	
50	IMPACT REVERSING SUB	5.500	2.400	1.0	2787.2
3	DRILL COLLARS			90.7	
5	CROSSOVER	5.200	2.500	1.8	
12	DUAL CIP VALVE	5.000	0.870	5.1	
60	HYDROSPRING TESTER	5.000	0.750	5.0	2889.8
80	AP RUNNING CASE	5.000	3.060	4.2	2892.0
15	JAR	5.030	1.750	5.0	
16	VR SAFETY JOINT	5.000	1.000	2.4	
70	OPEN HOLE PACKER	6.000	1.680	6.0	2906.0
70	OPEN HOLE PACKER	6.000	1.680	6.0	2912.0
5	CROSSOVER	5.200	2.000	0.7	
3	DRILL COLLARS			91.1	
5	CROSSOVER	5.200	2.000	0.9	
20	FLUSH JOINT ANCHOR	5.000	2.370	30.0	
81	BLANKED-OFF RUNNING CASE	5.000		4.1	3038.0
	TOTAL DEPTH				3041.0

EQUIPMENT DATA

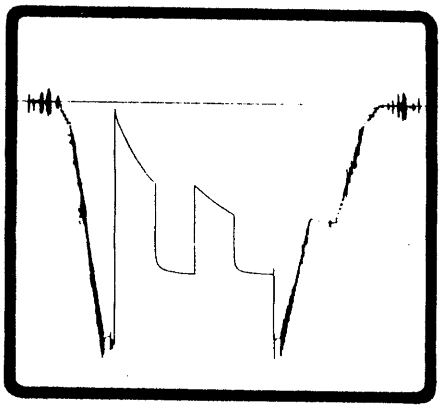
EQUATIONS FOR DST LIQUID WELL ANALYSIS

Transmissibility	$\frac{kh}{\mu} = \frac{162.6\ QB}{m}$	$\frac{md\text{-}ft}{cp}$
Indicated Flow Capacity	$kh = \frac{kh}{\mu}\ \mu$	md-ft
Average Effective Permeability	$k = \frac{kh}{h}$	md
Damage Ratio	$DR = .183\ \frac{P^{*} - P_f}{m}$	—
Theoretical Potential w / Damage Removed	$Q_1 = Q\ DR$	BPD
Approx. Radius of Investigation	$r_i = 4.63\sqrt{kt}$	ft

EQUATIONS FOR DST GAS WELL ANALYSIS

Indicated Flow Capacity	$kh = \frac{1637\ Q_g\ T}{m}$	md-ft
Average Effective Permeability	$k = \frac{kh}{h}$	md
Skin Factor	$S = 1.151\left[\frac{m(P^{*}) - m(P_f)}{m} - LOG\ \frac{kt}{\phi\ \mu\ c_t r_w^2} + 3.23\right]$	—
Damage Ratio	$DR = \frac{m(P^{*}) - m(P_f)}{m(P^{*}) - m(P_f) - 0.87\ mS}$	—
Indicated Flow Rate (Maximum)	$AOF_1 = \frac{Q_g\ m(P^{*})}{m(P^{*}) - m(P_f)}$	MCFD
Indicated Flow Rate (Minimum)	$AOF_2 = Q_g\sqrt{\frac{m(P^{*})}{m(P^{*}) - m(P_f)}}$	MCFD
Approx. Radius of Investigation	$r_i = 0.032\sqrt{\frac{kt}{\phi\mu c_t}}$	ft

FORMATION TESTING SERVICE REPORT



HALLIBURTON SERVICES

Duncan, Oklahoma 73536

A Halliburton Company

296-R4 Southwestern

HALLIBURTON

SERVICES

TICKET NO. 19814000

23-JAN-84

ADELAIDE

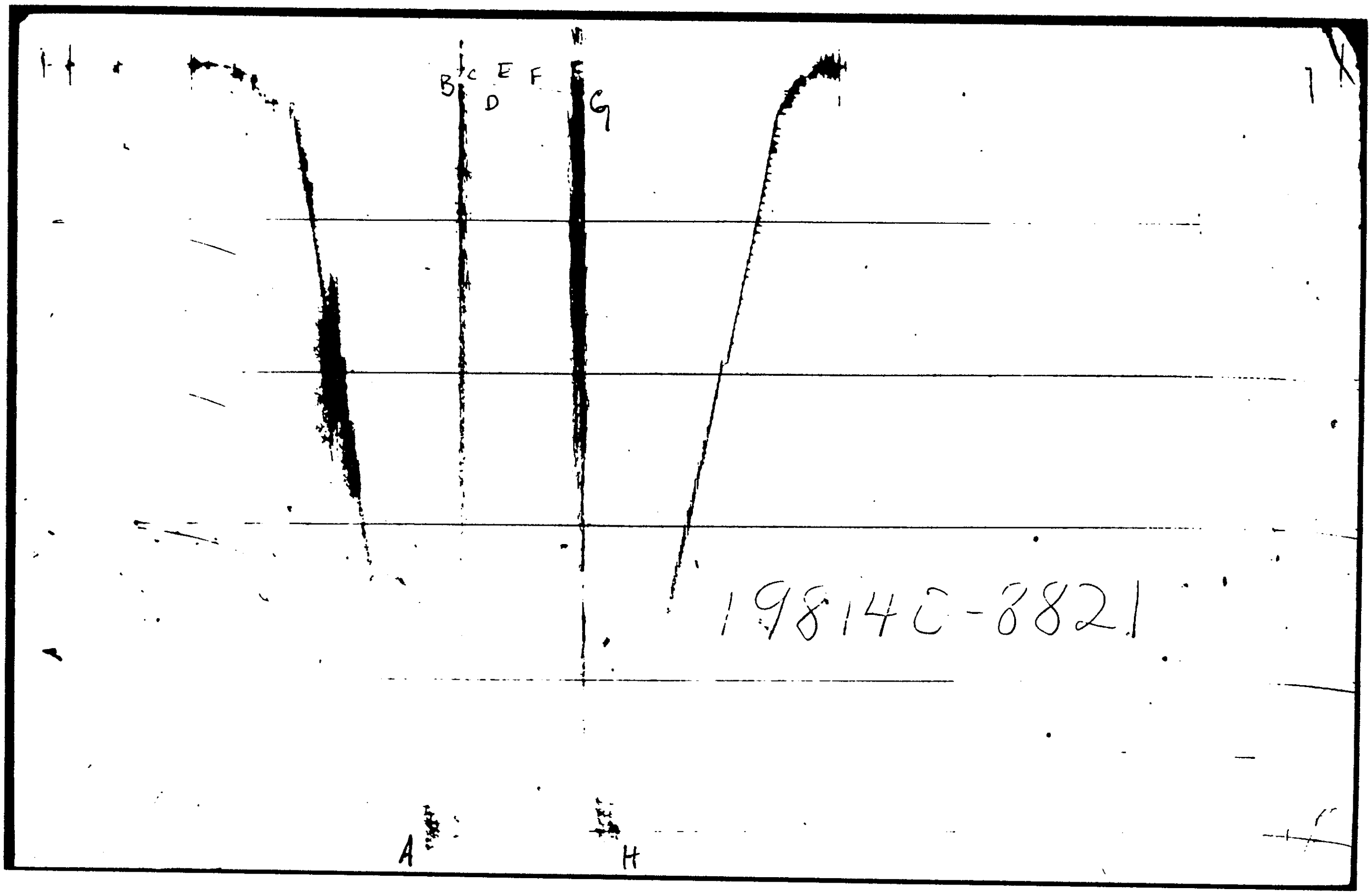
FORMATION TESTING SERVICE REPORT

LEGAL LOCATION SEC. - TWP. - RNG. HAYWOOD

FIELD AREA HAYWOOD

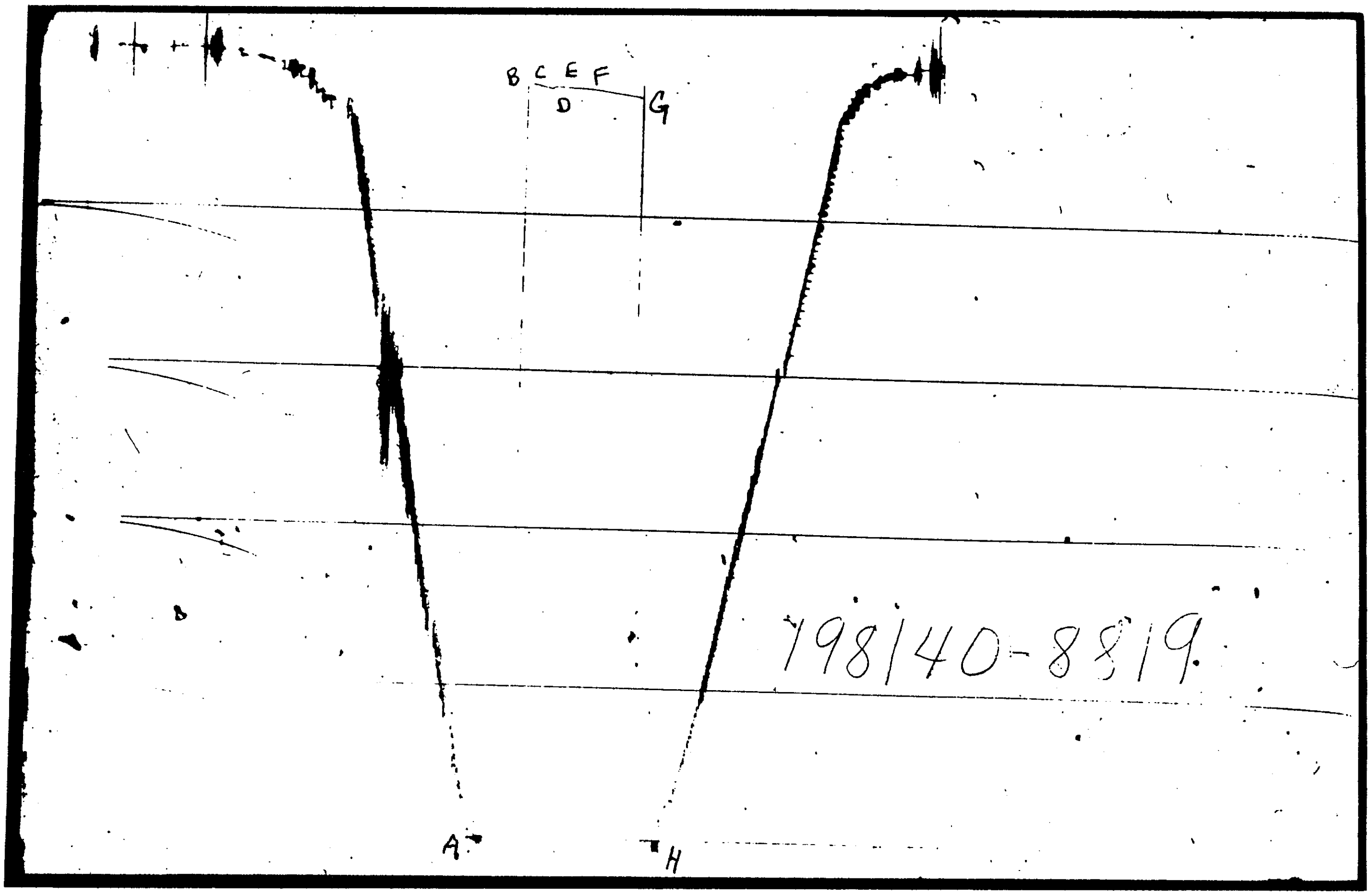
COUNTY VICTORIA

STATE AUSTRALIA BC



GAUGE NO: 8821 DEPTH: 9758.5 BLANKED OFF: NO HOUR OF CLOCK: 24

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC	5030	4963.2			
B	INITIAL FIRST FLOW		108.5	10.0	10.0	F
C	FINAL FIRST FLOW	98	113.3			
C	INITIAL FIRST CLOSED-IN	98	113.3	20.0	20.0	C
D	FINAL FIRST CLOSED-IN	148	138.0			
E	INITIAL SECOND FLOW	115	123.8	45.0	45.0	F
F	FINAL SECOND FLOW	164	132.5			
F	INITIAL SECOND CLOSED-IN	164	132.5	60.0	60.0	C
G	FINAL SECOND CLOSED-IN	361	186.7			
H	FINAL HYDROSTATIC	5030	4859.8			



GAUGE NO: 8819 DEPTH: 9878.0 BLANKED OFF: YES HOUR OF CLOCK: 24

ID	DESCRIPTION	PRESSURE REPORTED	PRESSURE CALCULATED	TIME REPORTED	TIME CALCULATED	TYPE
A	INITIAL HYDROSTATIC	5056	5037.0			
B	INITIAL FIRST FLOW	177	181.5	10.0	10.0	F
C	FINAL FIRST FLOW		185.4			
C	INITIAL FIRST CLOSED-IN		185.4	20.0	20.0	C
D	FINAL FIRST CLOSED-IN	209	209.3			
E	INITIAL SECOND FLOW	193	197.1	45.0	45.0	F
F	FINAL SECOND FLOW	209	208.0			
F	INITIAL SECOND CLOSED-IN	209	208.0	60.0	60.0	C
G	FINAL SECOND CLOSED-IN	257	254.0			
H	FINAL HYDROSTATIC	5056	4933.3			

EQUIPMENT & HOLE DATA

FORMATION TESTED: PRETTY HILL
NET PAY (ft):
GROSS TESTED FOOTAGE: 104.9
ALL DEPTHS MEASURED FROM: KB
CASING PERFS. (ft):
HOLE OR CASING SIZE (in): 8.500
ELEVATION (ft): 69
TOTAL DEPTH (ft): 9881.0
PACKER DEPTH(S) (ft): 9770, 9776
FINAL SURFACE CHOKE (in): 0.500
BOTTOM HOLE CHOKE (in): 0.750
MUD WEIGHT (lb/gal): 9.80
MUD VISCOSITY (sec): 44
ESTIMATED HOLE TEMP. (°F): 130
ACTUAL HOLE TEMP. (°F): 240 @ 9877.0 ft

TICKET NUMBER: 19814000

DATE: 1-2-84 TEST NO: 3

TYPE DST: OPEN HOLE

HALLIBURTON CAMP: ADELAIDE

TESTER: HUNT NICHOLS

WITNESS:

DRILLING CONTRACTOR: RICHTER #14

FLUID PROPERTIES FOR RECOVERED MUD & WATER

SOURCE	RESISTIVITY	CHLORIDES
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm

SAMPLER DATA

Psig AT SURFACE:
cu.ft. OF GAS:
cc OF OIL:
cc OF WATER:
cc OF MUD:
TOTAL LIQUID cc:

HYDROCARBON PROPERTIES

OIL GRAVITY (°API): @ °F
GAS/OIL RATIO (cu.ft. per bbl):
GAS GRAVITY:

CUSHION DATA

TYPE	AMOUNT	WEIGHT

RECOVERED:

230' OF MUD

MEASURED FROM TESTER VALVE

REMARKS:

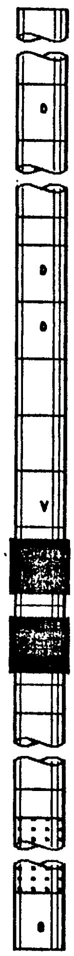
GROUND LEVEL ELEVATION WAS REPORTED AS 63.3 ~~FEET~~ m.

TYPE & SIZE MEASURING DEVICE: .50" CHOKE, MANIFOLD

TICKET NO: 19814000

TIME	CHOKE SIZE	SURFACE PRESSURE PSI	GAS RATE MCF	LIQUID RATE BPD	REMARKS
1-2-84					
0430					PICKED UP TEST TOOLS
0540					RAN IN HOLE WITH TEST TOOLS
0950					TAGGED BOTTOM
1000					PICKED UP TEST HEAD
1032					SET PACKER
1033					OPENED TOOL WITH A WEAK BLOW
1038					WEAK BLOW
1043					CLOSED TOOL
1103					OPENED TOOL WITH A VERY WEAK
					BLOW
1108					BLOW DYING
1113					BLOW STOPPED
1118					WELL DEAD
1148					CLOSED TOOL
1248					PULLED PACKER FREE, OPENED BY-
					PASS.
1300					LAID DOWN TEST HEAD
1330					PULLED OUT OF HOLE
1700					OUT OF HOLE WITH TEST TOOLS.

TICKET NO. 19814000



		O.D.	I.D.	LENGTH	DEPTH
3	DRILL COLLARS..................			454.9	
50	IMPACT REVERSING SUB...........	5.500	2.400	1.0	9712.3
3	DRILL COLLARS..................			30.1	
5	CROSSOVER......................	5.200	2.200	1.8	
12	DUAL CIP VALVE.................	5.000	0.870	5.1	
60	HYDROSPRING TESTER.............	5.000	0.750	5.0	9754.4
80	AP RUNNING CASE................	5.000	2.750	4.2	9758.5
15	JAR............................	5.000	1.750	5.0	
16	VR SAFETY JOINT................	5.000	1.000	2.3	
70	OPEN HOLE PACKER...............	5.000	1.680	5.9	9770.2
70	OPEN HOLE PACKER...............	5.000	1.680	5.9	9776.1
5	CROSSOVER......................	5.200	2.000	0.7	
3	DRILL COLLARS..................			61.7	
5	CROSSOVER......................	5.200	2.000	0.9	
20	FLUSH JOINT ANCHOR.............	5.000	2.750	35.0	
81	BLANKED-OFF RUNNING CASE........	5.000		4.1	9878.0
	TOTAL DEPTH				9881.0

EQUIPMENT DATA

EQUATIONS FOR DST LIQUID WELL ANALYSIS

Transmissibility	$\frac{kh}{\mu} = \frac{162.6\ QB}{m}$	$\frac{\text{md-ft}}{\text{cp}}$
Indicated Flow Capacity	$kh = \frac{kh}{\mu}\ \mu$	md-ft
Average Effective Permeability	$k = \frac{kh}{h}$	md
Damage Ratio	$DR = .183\ \frac{P^{*} - P_f}{m}$	—
Theoretical Potential w / Damage Removed	$Q_1 = Q\ DR$	BPD
Approx. Radius of Investigation	$r_i = 4.63\sqrt{kt}$	ft

EQUATIONS FOR DST GAS WELL ANALYSIS

Indicated Flow Capacity	$kh = \frac{1637\ Q_g\ T}{m}$	md-ft
Average Effective Permeability	$k = \frac{kh}{h}$	md
Skin Factor	$S = 1.151\left[\frac{m(P^{*}) - m(P_f)}{m} - \text{LOG}\ \frac{kt}{\phi\ \mu\ c_t r_w^2} + 3.23\right]$	—
Damage Ratio	$DR = \frac{m(P^{*}) - m(P_f)}{m(P^{*}) - m(P_f) - 0.87\ mS}$	—
Indicated Flow Rate (Maximum)	$AOF_1 = \frac{Q_g\ m(P^{*})}{m(P^{*}) - m(P_f)}$	MCFD
Indicated Flow Rate (Minimum)	$AOF_2 = Q_g\sqrt{\frac{m(P^{*})}{m(P^{*}) - m(P_f)}}$	MCFD
Approx. Radius of Investigation	$r_i = 0.032\sqrt{\frac{kt}{\phi \mu c_t}}$	ft

APPENDIX 8

GEOCHEMISTRY OF OIL FROM THE PEBBLE POINT FORMATION

RECEIVED 22 DEC 1983

amdel

PRELIMINARY GEOCHEMISTRY OF AN OIL SHOW
IN THE PEBBLE POINT FORMATION,
LINDON No.1, OTWAY BASIN

Beach Petroleum NL

F3/944/0-6293/84 December, 1983

service report

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES, FLEMINGTON STREET, FREWVILLE, SOUTH AUSTRALIA 5063

The Australian
Mineral Development
Laboratories
Flemington Street, Frewville
South Australia 5063
Phone Adelaide 79 1662
Telex AA82520

Please address all
correspondence to
P.O. Box 114 Eastwood
SA 5063
In reply quote:

amdel

22 December 1983

F3/944/0
6293/84

Beach Petroleum NL,
685 Burke Road,
CAMBERWELL Vic. 3124

Attention: Mr Steve Guba

REPORT F6293/84

CLIENT REFERENCE:	Letter from D.G. Langton dated 13 December, 1983
TITLE:	Preliminary Geochemistry of an oil show in the Pebble Point Formation, Lindon No.1, Otway Basin.
MATERIAL:	Oil and oil-cut mud
LOCALITY:	LINDON No.1
SAMPLE IDENTIFICATION:	DST 1
DATE RECEIVED:	15 December, 1983
WORK REQUIRED:	Whole-oil chromatogram. Gasoline-range hydrocarbon analysis (oil-cut mud). Interpretation.

Investigation and Report by: Drs David M. McKirdy and Brett A. Mooney

Chief - Fuel Section: Dr Brian G. Steveson

Manager, Mineral and Materials Sciences Division: Dr William G. Spencer

for Brian S. Hickman
Managing Director

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cah

1. INTRODUCTION

This report presents analytical data on oil and oil-cut mud recovered during a drillstem test of the Pebble Point Formation in Lindon-1.

The data are used to assess the source affinity, and thermal maturity of the oil and its degree of alteration by water-washing and/or biodegradation.

2. ANALYTICAL PROCEDURE

2.1 Gas Chromatography of Whole Oil

An aliquot (0.3 µl) of the oil (as received) was analysed by gas chromatography as follows:

Gas chromatograph:	Perkin Elmer Sigma 115
Column:	25 m x 0.3 mm fused silica, SGE QC3/BP1
Detector:	FID
Injector and detector temperature:	280°C
Carrier gas:	H_2 at 4 psi
Column temperature:	30°C for 1 min., then 2° per minute to 50°C and 7° per minute to 275°C.
Quantitation:	Relative concentrations of individual hydrocarbons obtained by integration of peak areas. Areas of peaks corresponding to aromatic hydrocarbons multiplied by appropriate response factors.

2.2 Gasoline-Range Hydrocarbon Analysis

The oil-cut mud (2 ml) was equilibrated in a sealed vial (5 ml) at 50°C for 30 minutes in a Perkin Elmer HS6 head-space analyser. The hydrocarbons in the head space were then analysed by gas chromatography as follows:

Gas chromatograph:	Perkin Elmer Sigma 2
Column:	50 m x 0.2 mm fused silica, SGE QC2/BP1
Detector:	FID
Injector and detector temperature:	250°C
Carrier gas:	He at 30 cm sec^{-1}
Column temperature:	30°C for 5 min., then 5° per minute to 250°C
Quantitation:	Relative concentrations of individual hydrocarbons obtained by integration of peak areas with Perkin Elmer Sigma 10 data station. Areas of peaks corresponding to aromatic hydrocarbons multiplied by appropriate response factors.

3. RESULTS

Whole-oil and gasoline-range analytical data on the Lindon-1 oil show are summarised in Tables 1-3. Figures 1 and 2 are whole-oil and gasoline-range chromatograms, respectively, of the oil in question. Figure 3 illustrates the genetic affinity and maturity of the oil based on its pristane/*n*-heptadecane and phytane/*n*-octadecane ratios. The Port Campbell-4 oil is included for comparison. Figures 4 and 5 show the source character and maturity, respectively, indicated by the gasoline-range composition of the oil.

4. DISCUSSION

4.1 Source

The C_5-C_7 (Fig. 4) and C_{12}+ (Fig. 3) hydrocarbon distributions of the Lindon-1 (Pebble Point) oil are consistent in indicating its generation from terrigenous (non-marine) organic matter.

The pristane/phytane ratio of the Lindon-1 crude (pr/ph = 3.7) is considerably lower than that of the Port Campbell-4 (upper Otway Group) non-marine oil (pr/ph = 7.5 : McKirdy and Horvath, 1976). This reflects differences in the original depositional environment of their respective source rocks. Higher pr/ph values indicate more oxic (less reducing) conditions (Powell and McKirdy, 1973). Both oils have a high wax content.

4.2 Maturity

The low pristane/*n*-heptadecane ratio of the Lindon-1 oil (pr/n-C_{17} <1) and its low heptane and isoheptane values (Fig. 5), are characteristic of thermally mature crude oils.

4.3 Water-Washing and Biodegradation

Depletion of the oil in benzene and toluene, as reflected in gasoline-range parameters 3 and 4 (Table 2), suggests that it has undergone appreciable water-washing in the reservoir. This would also account for the overall low relative abundance of light ends evident in the whole-oil chromatogram (Fig. 1).

The oil displays no obvious sign of biodegradation.

5. CONCLUSIONS

The Lindon-1 (Pebble Point) oil show is a mature non-marine waxy crude which has undergone some *in situ* water-washing.

6. REFERENCES

CONNAN, J., and CASSOU, A.M., 1980. Properties of gases and petroleum liquids derived from terrestrial kerogen at various maturation levels. *Geochim. Cosmochim. Acta*, 44, 1-23.

HUNT, J.M., 1979. *Petroleum Geochemistry and Geology*, Freeman, San Francisco.

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POWELL, T.G., and McKIRDY, D.M., 1973. Relationship between ratio of pristane to phytane, crude oil composition and geological environment in Australia. *Nature Phys. Sci.*, 243, 37-39.

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TABLE 1

AMDEL LIQUID HYDROCARBON ANALYSIS

LINDON NO 1
DST NO 1
--
--
OIL CUT MUD

BOILING POINT RANGE (DEG.C)	CARBON NUMBER	% BY WEIGHT	MOL %
-88.6	ETHANE	.00	.00
-42.1	PROPANE	.00	.00
-11.7	I-BUTANE	.00	.00
-0.5	N-BUTANE	.00	.00
27.9	I-PENTANE	.04	.12
36.1	N-PENTANE	.03	.09
36.1-68.9	C-6	.49	1.20
80.0	BENZENE	.00	.00
68.9-98.3	C-7	2.30	4.90
100.9	METHYL CYCLOHEXANE	2.20	4.75
110.6	TOLUENE	.03	.07
98.3-125.6	C-8	4.65	8.65
136.1-144.4	ETHYL BENZ.+ XYLENES	.41	.82
125.6-150.6	C-9	5.15	8.55
150.6-173.9	C-10	5.75	8.60
173.9-196.1	C-11	4.00	5.45
196.1-215.0	C-12	3.30	4.10
215.0-235.0	C-13	2.75	3.15
235.0-252.2	C-14	3.75	4.00
252.2-270.6	C-15	5.00	5.00
270.6-287.8	C-16	3.15	2.95
287.8-302.8	C-17	2.40	2.10
302.8-317.2	C-18	3.45	2.90
317.2-330.0	C-19	3.80	3.00
330.0-344.4	C-20	4.40	3.30
344.4-357.2	C-21	4.75	3.40
357.2-369.4	C-22	4.95	3.40
369.4-380.0	C-23	5.15	3.35
380.0-391.1	C-24	4.75	3.00
391.1-401.7	C-25	4.45	2.70
401.7-412.2	C-26	3.90	2.25
412.2-422.2	C-27	3.65	2.05
>422.2	C-28 + HIGHER H'CARBONS	11.35	6.10

0=LESS THAN 0.01%

THE ABOVE BOILING POINT RANGES REFER TO THE NORMAL PARAFFIN HYDROCARBON BOILING IN THAT RANGE. AROMATICS,BRANCHED HYDROCARBONS,NAPTHENES AND OLEFINS MAY HAVE HIGHER OR LOWER CARBON NUMBERS BUT ARE GROUPED AND REPORTED ACCORDING TO THEIR BOILING POINTS.

TABLE 2: OIL ANALYTICAL DATA, LINDON-1, OTWAY BASIN

Well	Test	Reservoir formation	API gravity	Pour point °C	Gasoline yield* %	Gasoline-Range Hydrocarbons							
						$\frac{n\text{-}C_6}{MCP}$	$\frac{n\text{-}C_7}{MCH}$	$\frac{3\ MP}{Benz}$	$\frac{MCH}{Tol}$	$\frac{i\text{-}C_5}{n\text{-}C_5}$	$\frac{3\ MP}{n\text{-}C_6}$	IV	HV
Lindon-1	DST 1	Pebble Point	n.d.	n.d.	21	0.76	0.21	-	32.9	1.77	0.88	1.23	7.08
Parameter						1	2	3	4	5	6	7	8

*Includes all compounds up to C_{10} (Hunt, 1979).

KEY TO GASOLINE-RANGE DATA SHEET

Individual Compounds

i-C_5	isopentane	
n-C_5	normal pentane	
3MP	3-methylpentane	
n-C_6	normal hexane	
MCP	methylcyclopentane	
Benz	benzene	
n-C_7	normal heptane	
MCH	methylcyclohexane	
Tol	toluene	
IV	Isoheptane value	(Thompson, 1983)
HV	Heptane value	(Thompson, 1983)

Parameter Specificity

1.	Maturity/Biodegradation
2.	Maturity/Biodegratation
3.	Water-washing
4.	Water-washing
5.	Maturity/Biodegradation
6.	Biodegradation
7.	Maturity
8.	Maturity (also source dependent)
-	Concentration of component(s) too low for reliable quantitation
n.d.	Not determined

TABLE 3: GASOLINE-RANGE (C_5-C_7) ALKANES

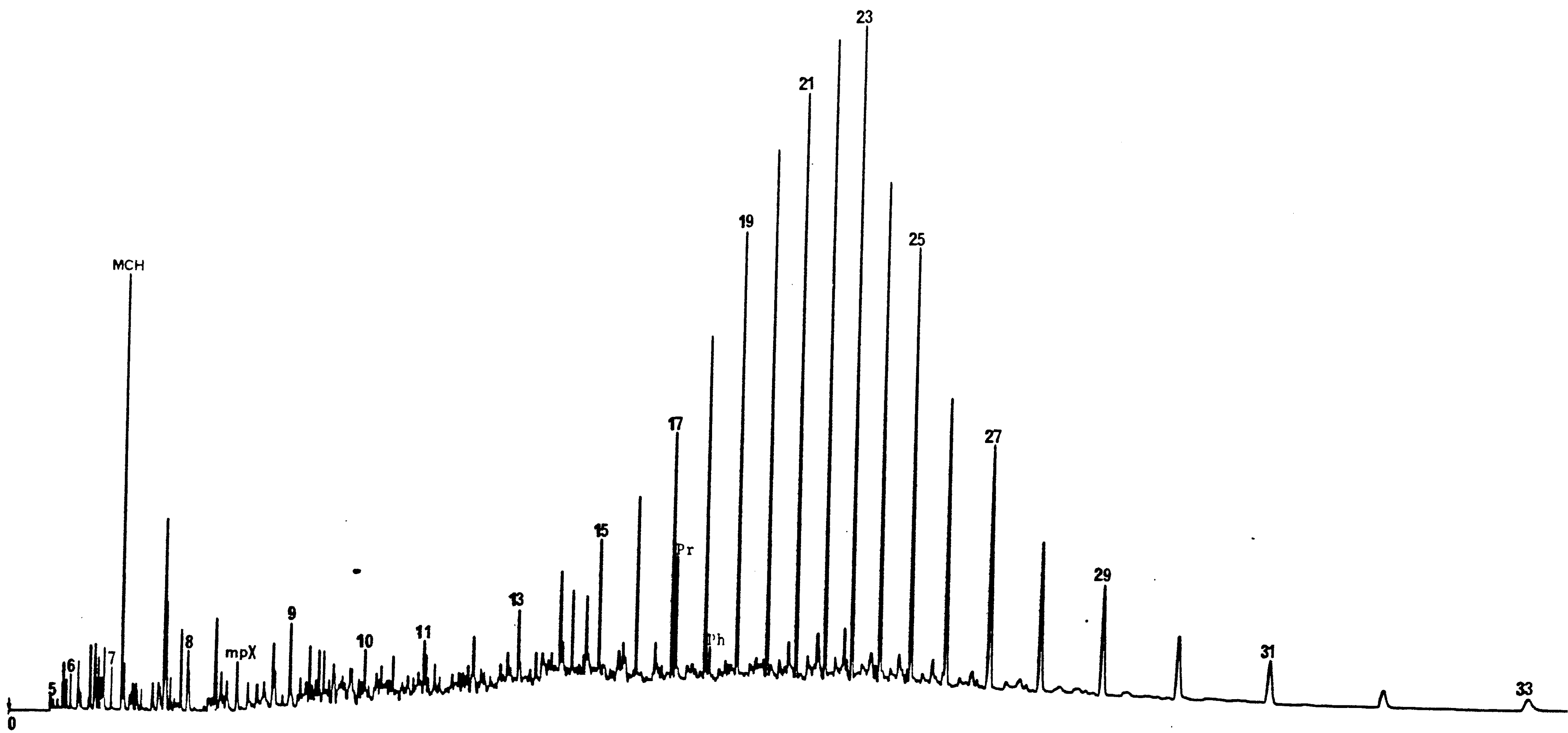
WELL: LINDON-1 BASIN: OTWAY

TEST: DST 1, PEBBLE POINT FORMATION DEPTH:

Peak No.	Compound	Peak Area %		
		Normal	Branched	Cyclic
1	2-Methylbutane		13.0	
2	*n*-Pentane	7.30		
3	2,2-Dimethylbutane		4.27	
5	2-Methylpentane		7.96	
6	3-Methylpentane		5.09	
7	*n*-Hexane	5.76		
8	Methylcyclopentane			7.61
9	2,4-Dimethylpentane		2.80	
10	Cyclohexane			5.16
11	2-Methylhexane		7.67	
12	1,1-Dimethylcyclopentane			-
13	3-Methylhexane		3.98	
14	*cis*-1,3-Dimethylcyclopentane			2.80
15	*trans*-1,3-Dimethylcyclopentane			2.49
16	*trans*-1,2-Dimethylcyclopentane			4.18
17	*n*-Heptane	3.47		
18	Methylcyclohexane			16.5
	Percentage of total identified C_5-C_7 alkanes	16.5	44.8	38.7

FIGURE 1

WHOLE-OIL CHROMATOGRAM
LINDON-1, DST 1



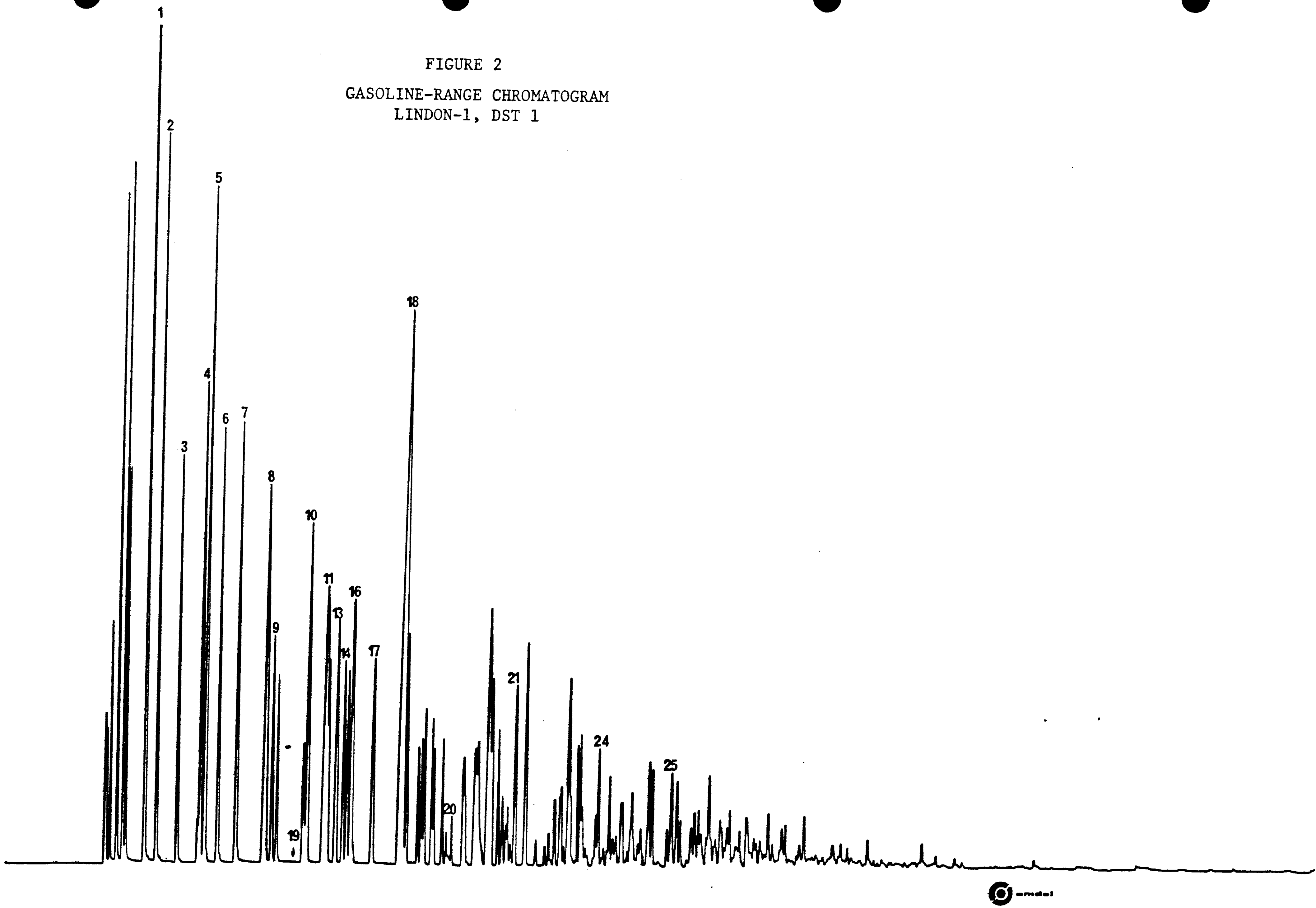


FIGURE 2

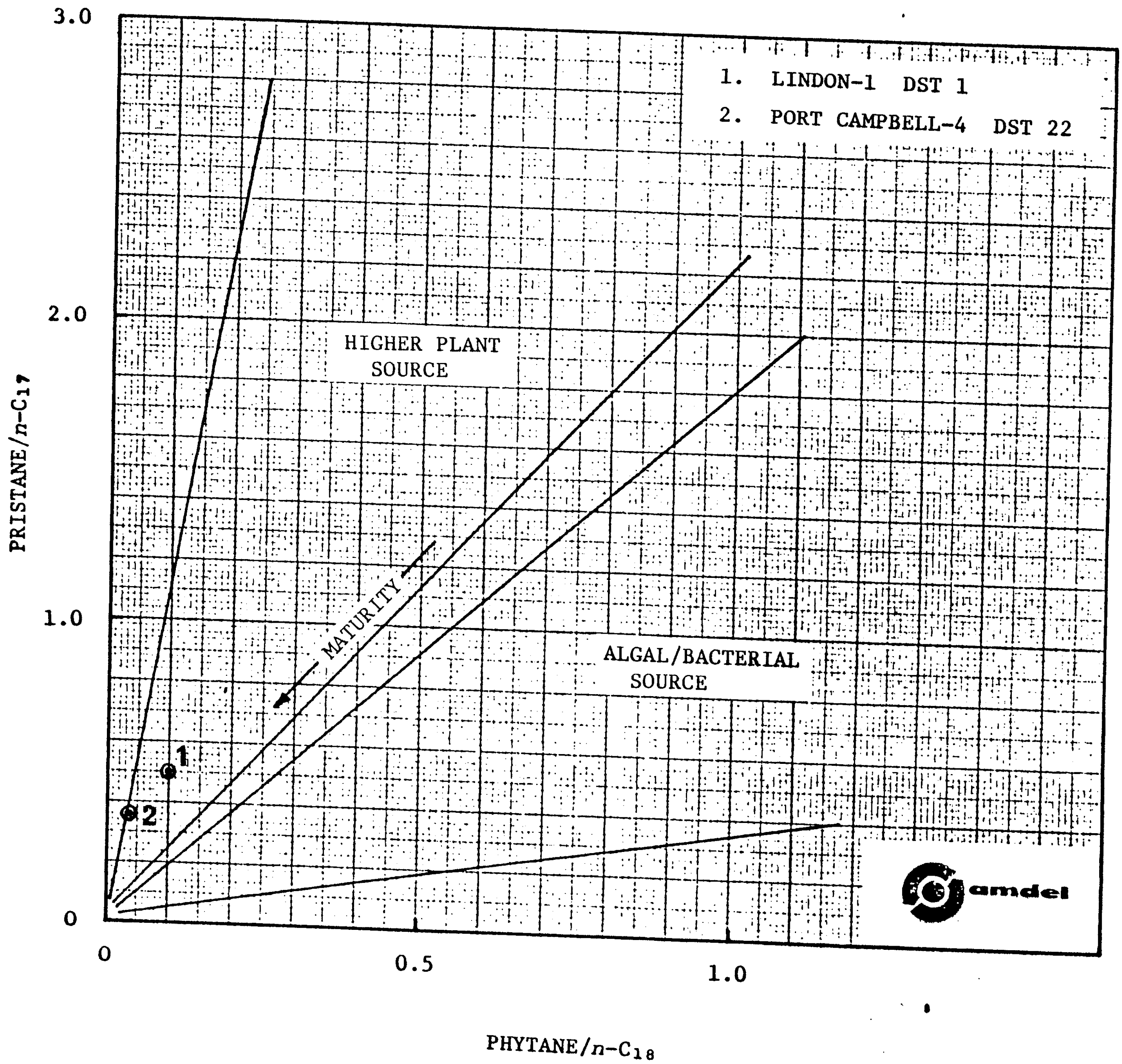
GASOLINE-RANGE CHROMATOGRAM
LINDON-1, DST 1

KEY TO GASOLINE-RANGE CHROMATOGRAM

1	2-Methylbutane
2	*n*-Pentane
3	2,2-Dimethylbutane
4	Cyclopentane
5	2-Methylpentane
6	3-Methylpentane
7	*n*-Hexane
8	Methylcyclopentane
9	2,4-Dimethylpentane
10	Cyclohexane
11	2-Methylhexane
12	1,1-Dimethylcyclopentane
13	3-Methylhexane
14	*cis*-1,3-Dimethylcyclopentane
15	*trans*-1,3-Dimethylcyclopentane
16	3-Ethylpentane and *trans*-1,2-Dimethylcyclopentane
17	*n*-Heptane
18	Methylcyclohexane
19	Benzene
20	Toluene
21	*n*-Octane
22	Ethylbenzene
23	*p*-Xylene and *m*-Xylene
24	*o*-Xylene
25	*n*-Nonane

FIGURE 3

GENETIC AFFINITY AND MATURITY
OF TWO OTWAY BASIN OILS



[based on Connan and Cassou, 1980, fig.12]

FIGURE 4

SOURCE CHARACTER BASED ON C_5-C_7 ALKANES

MICROBIAL = Algal/Bacterial

1. LINDON-1 (PEBBLE POINT)
2. NORTH PAARATTE-1 (WAARRE)

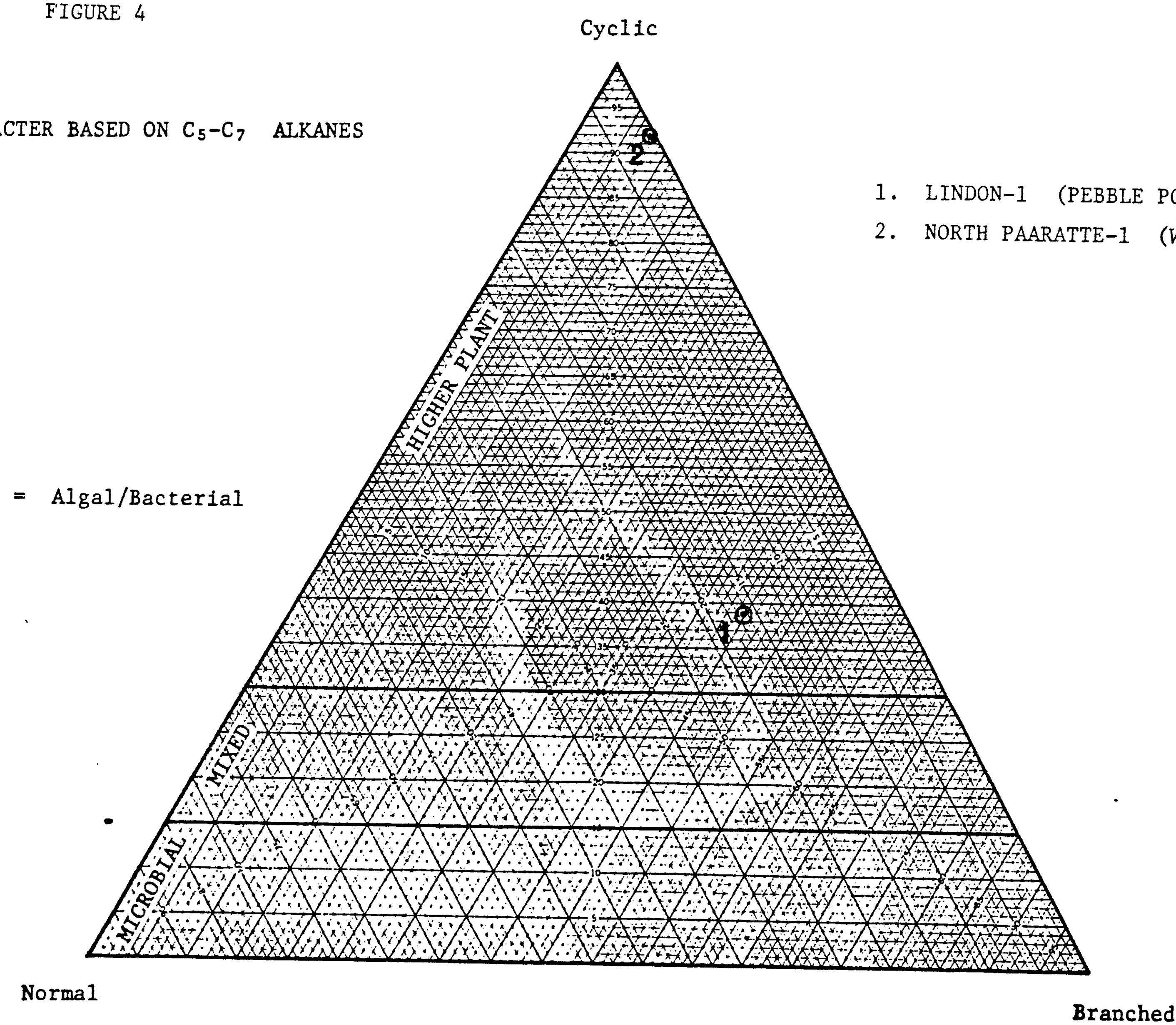
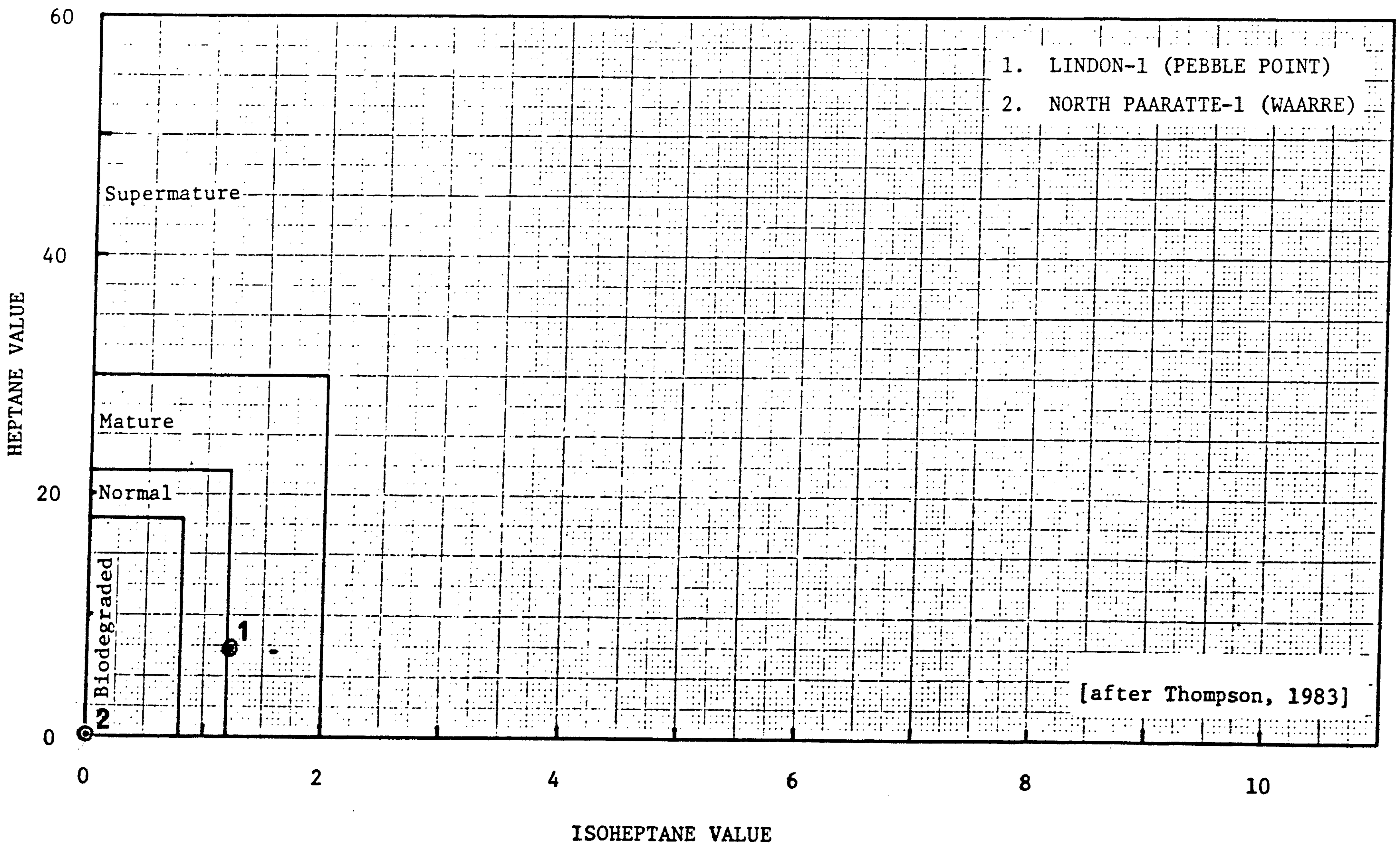


FIGURE 5

OIL TYPE BASED ON C_7 ALKANES



APPENDIX 9

OIL GRAVITY AND POUR POINT DETERMINATIONS - PEBBLE POINT FORMATION

BHP
Petroleum Laboratory
BHP Petroleum Pty. Ltd. (Incorporated in Victoria)
PO Box 264 Clayton Victoria Australia 3168
245 Wellington Road Clayton Victoria Australia
Telephone: (03) 560 7066 Telex: AA37958

RECEIVED - 1 FEB 1984

Sample Identification LINDON #1. CRUDE OIL
Supplied By BEACH PETROLEUM
Date Received 19.1.84
Laboratory Sample Number 4550
Laboratory Inspection Report Number 1952

Results of Analyses

Method	Test		Result
ASTM D4052-81	DENSITY @ 15°C API GRAVITY	g/ml	0.8822 28.8
ASTM D97-66	POUR POINT	°C	33

Report Date ?1/1/84
Report By L. Findlay
Approved By [signature]
Comments.

APPENDIX 10

PALYNOLOGY RESULTS

PALYNOLOGICAL REPORT OF THE LINDON-1 WELL FOR BEACH PETROLEUM N/L

BY

V ARCHER

GEOLOGICAL SURVEY OF VICTORIA 1984

PALYNOLOGICAL REPORT ON THE LINDON NO.1 WELL FOR BEACH PETROLEUM N/L

Side wall core samples from the Lindon No. 1 well were examined for palynological dating purposes for Beach Petroleum N/L. The palynomorph yields for all samples were low, particularly for the deepest samples where a sparse yield was obtained at 2848m, and no yield was obtained at 3001.4m.

Above this at 2449m, the palynomorph assemblage is assignable to the D. speciosus Zone on the basis of the presence of P. notensis and D. speciosus. While the assemblage can be considered non-marine, the presence of a small number of acritarchs (Leiosphaeridia spp.) indicate an aquatic environment in the sediments. The number and diversity of the acritarchs increase going up through the sequence, indicating an increasing aquatic (brackish), influence (Burger 1980).

The samples at 1752.5m and 1237.5m are both non-marine, but contain a higher proportion of acritarchs than the deeper sample and the palynomorph yield is low and poorly preserved. The poor preservation and sparse yield of these samples allows only for a range of zones to be given. The sample at 1752.5m contains a corroded specimen of C. pseudotripartitus which together with F. asymmetricus limits the assemblage to the upper C. paradoxa - middle T. pannosus zones (Middle Albian - early Cenomanian).

The 1237.5m sample contains the species Cupuliferoidaepollenites cf. parvulus, an angiosperm which does not appear until the T. pannosus zone. The presence of K. jubatus restricts the assemblage to the T. pannosus - C. triplex zones (Late Albian - early Coniacian).

At 1223.1m the assemblage contains both dinoflagellates and spores and pollen, indicating a restricted marine environment. Reworking from the early Cretaceous C. paradoxa Zone is evident although this zone was not found in the samples examined. Permian reworking is also present. the assemblage contains frequent A. dilwynensis, an angiosperm which ranges from the A. distocarinatus Zone; (Cenomanian) and C. triplex which ranges from the C. triplex Zone (Turonian). The dinoflagellate species present indicate a Senonian age for the assemblage; restricted to the Santonian - early Campanian by the presence of Heterosphaeridium spp. (Wilson & Clowes 1980).

At 1206.8m the sample contains dinoflagellate species which restrict the assemblage to the Santonian. The assemblage contains Heterosphaerdium spp., I. cretaceum and A. denticulata which are indicative of the I cretacea Zone. (Partridge et al, 1979 (Unpublished)).

The spore pollen zonation scheme used is that of Dettmann & Playford 1969. For the marine samples the dinoflagellate zonation scheme of Partridge et al 1979 (Unpublished) is used. The age of the sample at 1223.1m, while based on dinoflagellate species ranges, contained no index fossils for a particular zone and hence no zone is given. Both of the samples (1223.1 and 1206.8m) would be equivalent in age to the T. pachyexinus spore-pollen zone of Dettmann & Playford.

RESULTS OF THE PALYNOLOGICAL DATING OF LINDON-1 FOR BEACH PETROLEUM

SAMPLE DEPTH (m)	CONFIDENCE RATING	BIOSTRATIGRAPHIC ZONE	AGE
1206.8	1	I.cretacea zone	Santonian
1223.1	2	-	Santonian-Early Campanion
1237.5	2	T.panosus - C.triplex	Late Albian - early Coniacian
1752.5	2	Upper C. paradoxa - mid T. pannosus	Middle Albian - early Cenomania
2449	1	D. speciosus Zone	Neocomian - Early Albian
2848		Indeterminate	
3001.4		Barren-Indeterminate	

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

SPECIES LIST : LINDON NO. 1

Depth(m)	1206.8m	1223.1	1237.5	1752.5	2449	2848
Aequitriradites verrucosus				+	+	
Alisporites grandis				+	+	
A. similis					+	
Amosopollis dilwynensis		+				
Baculatisporites comaumensis					+	
Camarozonosporites sp.			+			
Ceratosporites equalis					+	
Clavifera triplex		+				
Cicatricosisporites australiensis			+		+	
C. ludbrookiae					+	
C. pseudotripartitus				+		
C. of C. cuneiformis		+		+		
Classopollis cf. C. classoides			+	+	+	
Cupuliferoidaepollenites cf parvulus			+			
Cyathidites australis		+	+	+	+	+
C. minor			+			
Dictyophyllidites sp.	+					
Dictyotosporites speciosus					+	
Foraminisporis asymmetricus				+		
F. dailyi					+	
Ginkgocycadophytus nitidus					+	
Gleicheniidites cf G. circinidites		+	+			
Klukisporites scaberis					+	
Kraeuselisporites jubatus			+			
Laevigatosporites ovatus		+				
Leptolepidites verrucatus					+	
Lunatisporites sp.		R/W				
Lycopodiumsporites spp.			+		+	
Marsupipollenites triradiatus striatus		r/W				
Microcachyridites antarcticus		+	+			
Neoraistrickia truncatus					+	
Nothofagidites emarcidus/heterus			C			
Osmundacidites wellmanii			+			
Parasaccites gondwanensis		R/W	R/W			
Pilosisporites grandis		R/W				
P. notensis					+	

Depth(m)	1206.8m	1223.1	1237.5	1752.5	2449	2848
Podocarpidites cf P. ellipticus	+				+	+
Polycingulatisporites densatus				+		
Stereisporites antiquasporites			+	+		
Triporoletes radiatus				+		
Trisaccites microsaccatus	+		+		+	
Tsugaepollenites dampieri	+					
Dinoflagellates						
Amphidiadema denticulata	+					
Chatangiella tripartita	+					
Cyclone phelium distinctum		+				
Dinogymnium cf. D. nelsonense		+				
aff. Dioxya armata			+		+	
Heterosphaeridium conjunctum		+				
H. heteracanthum	+	+				
Impagidinium cf. I. margaritiferum		+				
Isabelidinium belfastense	+					
I. cretaceum	+					
Odontichitina operculata		+				
Acritarchs						
Leiosphaeridia spp.			+	+	+	
Micrhystridium sp.			+			
Unclassified palynomorphs						
Schizosporis spp.		+	+		+	

R/W - reworked

C - cavings, contamination

REFERENCES

BURGER D., : 1980 Palynology of the Lower Cretaceous in the Surat Basin. Bur. Miner Resour, Aust. Bull. 189 : 106 pp

DETTMANN, M. E., & PLAYFORD , G., . 1969 Palynology of the Australian Cretaceous : A review; in Stratigraphy and Palaeontology : Essays in Honour of Dorothy Hill. Ed. K. S. W. Campbell. ANU Press Canberra, 174-210

WILSON, G. J. & CLOWES, C. D. : 1980 A Concise Catalogue of Organic- Walled Fossil Dinoflagellate Genera. N. Z. Geol. Surv. Rep. 92 : 199 pp

PALYNOLOGICAL REPORT ON SAMPLES FROM THE

LINDON NO 1 WELL

FOR BEACH PETROLEUM N L

V ARCHER/MAY 1984

RESULTS OF THE PALYNOLOGICAL DATING OF THE LINDON NO 1 WELL FOR EACH PETROLEUM N L.

Two samples from depths of 2900m and 3005m, both cuttings, were examined for palynological dating purposes.

Previous examination of other samples from this well at similar depths (2848.0m and 3001.4m) gave indeterminate results due to the sparse to barren palynomorph yields. For these latest samples extra material was prepared in an attempt to extract an adequate number of palynomorphs for dating purposes.

Both samples however contained sparse, poorly preserved palynomorph assemblages which showed a high degree of carbonization.

Only a few of the species present have retained their surface features sufficiently to enable identification. The following species were identified:-

2900m	Alisporites grandis
	Cyathidites australis (most common)
	Klukisporites scaberis
	Monosulcites minimus
3005m	Cyathidites australis (most common)
	C. minor
	Klukisporites scaberis
	Trilobosporites sp.

The sample at 3005m has the slightly higher yield.

CONCLUSION

The samples in the interval between 2848m (from the previous report) and 3005m (this report) in the Lindon No 1 well have provided insufficient data for palynological dating. The two samples examined for this report yielded a few poorly preserved and thermally altered Mezozoic species.

APPENDIX 11

PETROLOGY REPORT - PEBBLE POINT FORMATION

PHILIP E. BOCK
GEOLOGICAL CONSULTANT

PETROLOGY
BIOSTRATIGRAPHY
PETROLEUM GEOLOGY
HYDROGEOLOGY

32 SWAYFIELD ROAD
MT. WAVERLEY
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TELEPHONE 288 4491

23rd December 1983

PETROLOGICAL REPORT FOR BEACH PETROLEUM LTD

PLUG OFFCUTS FROM CORE - 1 AT LINDON - 1

PLUG 3: 913.48

Name: Chloritic very coarse quartz sandstone.

Megascopic properties: Friable, grey-green, poorly sorted.

Microscopic properties: About 50% quartz grains
About 40% 'clay' matrix
About 5% siderite cement
About 5% apparent porosity

Fabric: Reasonably homogeneous; no visible bedding features; no obvious preferred orientation.
Grain size: Highly variable; the grains range from about 0.25 mm up to 4 mm diameter; the modal diameter would be about 1 mm
Grains are mainly well-rounded, with roundness being poorer in the smaller size fractions. Sphericity of grains is moderate.

Quartz grains: mainly single crystal, with straight extinction. Grains are coated with a thin layer of the green 'chlorite', similar to the material of the matrix.
K-felspar: Trace; reasonably fresh.
'Chlorite' pellets: Less than 5% of rock: these have structureless interiors of green phyllosilicate and are coated with concentrically banded green-brown phyllosilicate. (chamosite?).
Matrix: Greenish, near-isotropic 'chlorite'.
Cement: Yellowish siderite is seen as small angular pore-filling material.

PLUG 5: 914.09

Name: Chloritic very coarse quartz sandstone.

Megascopic properties: friable, grey-green, poorly sorted.

Microscopic properties: About 60% grains
about 35% 'clay' matrix
about 5% porosity
trace of siderite cement

The main differences between this rock and Core 3 are:
Better packing of grains, with less matrix.
More fine-grained quartz grains, so that the sand material is distinctly bimodal.
Many quartz grains are internally fractured, with fracture filling of 'chlorite' or siderite.
A grain of garnet with oolitic coating of phyllosilicate is present in this section.
The siderite cement filling some pores is localised in small areas of the section.

PLUG 7: 914.75

Megascopic properties: Friable, grey, poorly sorted

Microscopic properties: about 70% quartz grains
about 28% matrix and cement
about 2% porosity.

The main differences between this rock and Core 3 are:
Higher proportion of quartz grains.
Quartz grains are generally more angular.
Lower proportion of 'chlorite' pellets; concentrically banded oolitic growths are absent; clay films on quartz grains are thin.
The matrix is brown, near-isotropic phyllosilicate.
Siderite cement is localised in patches.

Comments:

Correct mineralogical identification of the phyllosilicates cannot be attempted without X-ray diffraction or other technique. The term 'chlorite' is used for green-coloured minerals; but these may in fact be other clay minerals, e.g. of the smectite group.

The porosity appears to be high, when using a stereomicroscope to examine the core sample; clay films are loosely attached to the grains, and do not appear to fill the pore spaces. In thin section, the angular pores seem to have been filled by matrix or cement, but pores exist where separation of matrix from grains has taken place. It is not possible to say if this is caused by the treatment by drying on a hotplate and impregnation with epoxy. It is recommended that care be taken with samples if they are to be used for porosity or permeability measurement, as drying may irreversibly alter the true in situ properties of these rocks. The thin section technique used here is not a reliable method of porosity determination in this case.

Interpretation: The source area was mainly sedimentary, probably including an area of quartz sands which were already well-rounded in the coarse fraction. These were initially deposited in a high energy zone, probably near-shore marine. The clay matrix was being added at the same time, forming oolites and clay films on the framework grains. The environment was under reducing conditions; this suggests a marine or terrestrial environment with abundant organic matter. Possible environments include shallow-marine, deltaic, or estuarine.

PETROLOGICAL REPORT FOR BEACH PETROLEUM LTD

PHILIP E. BOCK

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PETROLOGICAL REPORT FOR BEACH PETROLEUM LTD

Additional detailed study of these samples included photomicrography and point count analysis of thin sections, and scanning electron micrography. X-ray diffraction study was also attempted but has not yet been succesful in identifying the non-quartz fraction positively.

1. Point Count Analysis

500 points were counted from each thin section. The results are as follows:

Plug depth (m)	Quartz (%)	Clay Grain (%)	Clay Matrix (%)	Carbonate (%)	Porosity (%)
913.48	46.0	3.4	35.6	5.8	9.2
914.09	57.0	2.8	30.2	1.6	8.4
914.75	49.6	1.6	38.0	5.8	3.0

2. Photomicrographs (Illustrations 13-24)

These show that most of the porosity occurs as zones closely surrounding the framework grains. The lowest porosity is shown in photos 21 and 22, from 914.75. 'Normal' intergrain porosity can be seen best in photos 19, 20, and 24, but these all suggest that the pores have few interconnections, which are mainly plugged with the films of 'clay' which surround the grains. It was originally suspected that the openings surrounding grains may have been formed artificially by the methods used to impregnate the rock with epoxy, prior to the preparation of the slide. However, this was ruled out by later study using the scanning electron microscope. The annular 'pores' are not a type of porosity which has been described in conventional references, and it is difficult to see how they could have formed by the processes of deposition and diagenesis.

Photo 15 shows secondary carbonate (siderite) which is distributed patchily in the rock samples. This appears to be a later addition than the clay, and would have further reduced the porosity of the rock.

Photo 17 shows a single grain of garnet, one of the very rare heavy minerals seen in thin section.

3. Scanning Electron Micrography.

The plugs were mounted on a specimen stub and allowed to dry in air, then coated with gold under a vacuum. They have not been heated.

Low-power stereoscopic pairs were taken to illustrate the grain-matrix relationships (photos 1 & 2; 5 & 6)

Photos 1 and 2 (914.09 m) show the rounding and grain-size variation in a typical sample. the presence of clay as thin layers encrusted on the quartz grains is very obvious, and in many places these flakes are peeling away from the grains, in the same way that the colour photomicrographs show as thin layers of porosity around the grains. Therefore this phenomenon is not due to the process of slide preparation. This pair of photos shows a high apparent porosity, including that between grains.

Photo 4 is most illustrative of the relation between grains and matrix. The clay matrix has separated from the quartz grains, leaving significant pore spaces, and the matrix has also cracked with a sharply defined, jagged crack. I believe that these cracks are not likely to have been formed by depositional or diagenetic processes, but are caused by the shrinkage of the clay matrix when the sample was dried.

Photos 5 & 6 illustrate grain-matrix relationships, but the amount of matrix is greater than in 1 & 2.

Photo 9 also shows very well the 'shrinkage' cracking of the clay matrix. The smooth surfaces are former contacts with large grains.

Use of qualitative analysis with an energy-dispersive electron-probe microanalyser showed that the only significant elements present were Si, Al, and Fe. Mg was practically absent.

Photos 4 and 9 suggest a linear shrinkage of the order of 3 to 5%. Taking 5% as a guide, this represents a 14% volumetric shrinkage of the clay matrix (0.95 x 0.95 x 0.95 = 0.857). If this is applied to a matrix making up about 40% of the original rock volume, it would create an artificial porosity of 5.7% (0.143 x 0.4).

If 3% linear shrinkage is assumed as a lower limit, then the artificial porosity is about 3.3% (0.97 x 0.97 x 0.97 = 0.913; .087 x 0.38 = 0.033)

4. X-ray diffraction was not successful, as the peaks for quartz dominated over the peaks for phyllosilicate. Absence of 10 A peaks suggests that montmorillonite is not significant, and absence Of 14 a peaks suggests that chlorite is not present. The diffuse peaks present point to kaolinite as the main clay mineral, but this does not explain the nature of the iron present, as recorded in electron probe identification.

[signature]

SCANNING ELECTRON MICROGRAPHS

CORE 914.09m

1,2. STEREO PAIR AT 30 x
SHOWING RANGE OF GRAIN SIZE OF ROUNDED QUARTZ, SURFACE COATING BY PHYLLOSILICATE, BREAKING OFF AS FLAKES; SIGNIGICANT INTER GRAIN POROSITY.

3. LOW POWER - NOT VERY SIGNIFICANT

4. QUARTZ GRAIN AND NEIGHBOURS AT 300 x
- SHOWS SIGNIFICANT 'CRACKING' OF PHYLLOSILICATE MATRIX.
- PROBABLY DUE TO DEHYDRATION SHRINKAGE. THIS IS 'ARTIFICIAL' POROSITY, AND I BELIEVE HAS BEEN FORMED AFTER REMOVAL OF THE CORE, BECAUSE OF THE SHARP OUTLINES. I ESTIMATE THAT SHRINKAGE IS OF THE ORDER OF 5% OF LINEAR DIMENSIONS. THIS COULD CONTRIBUTE MORE THAN 2% OF THE MEASURED POROSITY OF THE BULK ROCK.

PE905862

This is an enclosure indicator page.
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container PE902502 at this location in this
document.

The enclosure PE905862 has the following characteristics:

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BASIN = OTWAY BASIN
PERMIT = PEP/105
TYPE = WELL
SUBTYPE = PHOTOMICROGRAPH
DESCRIPTION = Scanning Electron Microscope Photograph, figres 1-4, (from appendix 11--Petrology--of WCR) for Lindon-1
REMARKS = page contains 4 phototgraphs
DATE_CREATED =
DATE_RECEIVED =
W_NO = W841
WELL_NAME = LINDON-1
CONTRACTOR =
CLIENT_OP_CO = BEACH PETROLEUM NL.

(Inserted by DNRE - Vic Govt Mines Dept)

1) ↑ L

208/8

914.09 30X

2/ ↑ R

208/9

914.09 m 30X

3/

208/7

914.09 17X

4/

209/1 300X

914.09

PE905863

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The enclosure PE905863 is enclosed within the container PE902502 at this location in this document.

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          SUBTYPE = PHOTOMICROGRAPH
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        WELL_NAME = LINDON-1
       CONTRACTOR =
     CLIENT_OP_CO = BEACH PETROLEUM NL.
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(Inserted by DNRE - Vic Govt Mines Dept)

ENLARGEMENT OF FIG. 1

PE905873

This is an enclosure indicator page.
The enclosure PE905873 is enclosed within the container PE902502 at this location in this document.

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PERMIT =	PEP/105
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SUBTYPE =	PHOTOMICROGRAPH
DESCRIPTION =	Scanning Electron Microscope Photograph,enlargement of figure 4, (from appendix 11--Petrology--of WCR) for Lindon-1
REMARKS =	page contains 1 large photograph
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DATE_RECEIVED =	
W_NO =	W841
WELL_NAME =	LINDON-1
CONTRACTOR =	
CLIENT_OP_CO =	BEACH PETROLEUM NL.

(Inserted by DNRE - Vic Govt Mines Dept)

ENLARGEMENT OF FIG. 4

CORE 913.48m

5,6. STEREOPAIR AT LOW POWER TO SHOW GRAIN SIZE VARIATION, GRAIN-MATRIX RELATIONSHIPS, AND APPARENT LOW POROSITY. SOME 'DEHYDRATION' CRACKS APPARENT.

7. 'DEHYDRATION' CRACKS IN MATRIX.

8. SHOWS LAYERED NATURE OF 'MATRIX' COVERING A QUARTZ GRAIN. SIMILAR TO OOLITIC STRUCTURE.

PE905864

This is an enclosure indicator page.
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BASIN =	OTWAY BASIN
PERMIT =	PEP/105
TYPE =	WELL
SUBTYPE =	PHOTOMICROGRAPH
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REMARKS =	page contains 4 phototgraphs
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DATE_RECEIVED =	
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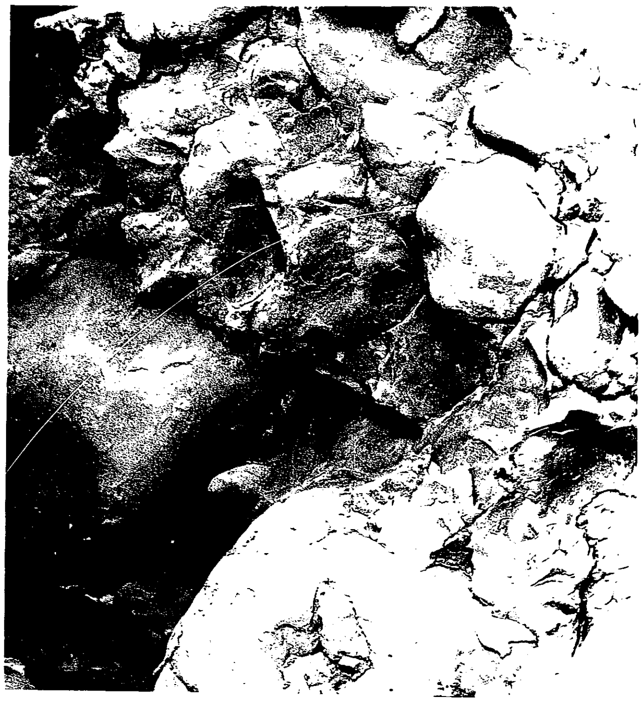
WELL_NAME =	LINDON-1
CONTRACTOR =	
CLIENT_OP_CO =	BEACH PETROLEUM NL.

(Inserted by DNRE - Vic Govt Mines Dept)



↑ L

5/

207/2

913.48 21X

↑ R

6/

207/3

913.48 21X

7/

207/4

913.48 120X

8/

207/7

913.48 120X

PE905865

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DATE_RECEIVED =	
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WELL_NAME =	LINDON-1
CONTRACTOR =	
CLIENT_OP_CO =	BEACH PETROLEUM NL.

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ENLARGEMENT OF FIG. 7

CORE 914.09m & 913.48m

9. SHOWS SMOOTH SURFACE OF MATRIX IN CONTACT WITH A QUARTZ GRAIN; 'DEHYDRATION' CRACKING; AND SITES OF ORIGINAL POROSITY - TOWARDS RIGHT CENTRE.

10. SHOWS MATRIX FLAKING AWAY FORM GRAINS.

11. SHOWS 'DEHYDRATION' CRACKS - NOTE SHARP, JAGGED OUTLINE, WHICH IS UNLIKELY TO BE PRESENT IN THE NATURAL SYSTEM.

12. SHOWS THIN LAYERS OF PHYLLOSILICATE AROUND A QUARTZ GRAIN.

PE905866

This is an enclosure indicator page.
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PERMIT =	PEP/105
TYPE =	WELL
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DESCRIPTION =	Scanning Electron Microscope Photograph, figures 9-12, (from appendix 11--Petrology--of WCR) for Lindon-1
REMARKS =	page contains 4 phototgraphs
DATE_CREATED =	
DATE_RECEIVED =	
W_NO =	W841
WELL_NAME =	LINDON-1
CONTRACTOR =	
CLIENT_OP_CO =	BEACH PETROLEUM NL.

(Inserted by DNRE - Vic Govt Mines Dept)

9/

208/10

914.09 300X

10/

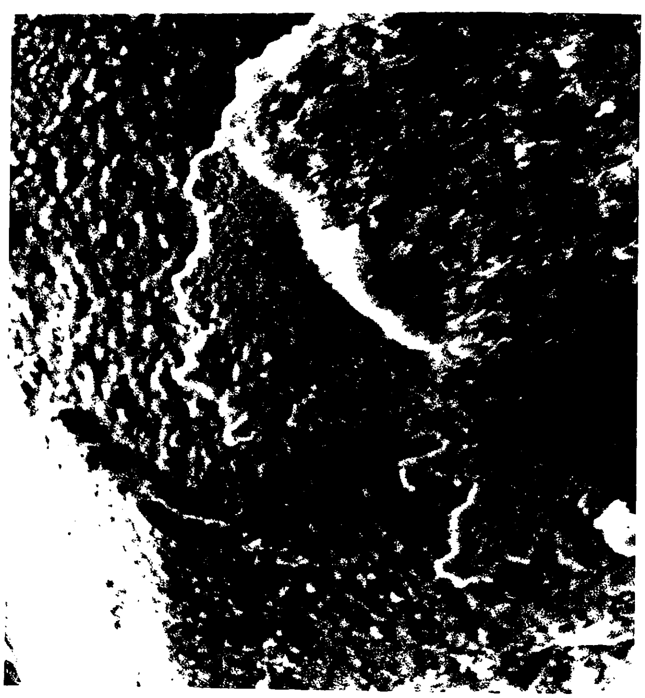
207/6

913.48 600X

11/ A5

209/4

914.09 1200X



12/

207/9

913.48 m 600X

PHOTO MICROGRAPHS

CORE 913.48m

13,14. AT LOW POWER (35x)

SHOWS GRAINSIZE VARIATION, MATRIX, AND POROSITY MAINLY AT CONTACTS BETWEEN GRAINS AND MATRIX.

13. SHOWS SOME LOCATIONS OF PROBABLE ORIGINAL POROSITY. (TOP RIGHT)

15,16. AT 140x

15. SHOWS TWO PATCHES OF CARBONATE CEMENT FILLING PORES.

PE905867

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The enclosure PE905867 has the following characteristics:

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CONTAINER_BARCODE = PE902502
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BASIN = OTWAY BASIN
PERMIT = PEP/105
TYPE = WELL
SUBTYPE = PHOTOMICROGRAPH
DESCRIPTION = Photomicrographs of core 913.48m; no.'s 13, 14, 15 & 16; (from appendix 11--Petrology--of WCR) for Lindon-1
REMARKS = page contains 4 phototgraphs
DATE_CREATED =
DATE_RECEIVED =
W_NO = W841
WELL_NAME = LINDON-1
CONTRACTOR =
CLIENT_OP_CO = BEACH PETROLEUM NL.

(Inserted by DNRE - Vic Govt Mines Dept)

13

14

16

PHOTOMICROGRAPHS

17-20- 914.09m

17,18- 35 x MAGNIFICATION

19,20- 140 x MAGNIFICATION

17 - SHOWS 'DEHYDRATION' POROSITY, 'ORIGINAL' POROSITY, AND A GARNET GRAIN WITH 'OOLITIC' COATING BY PHYLLOSILICATE. (LOWER LEFT)

18. - SHOWS 'DEHYDRATION' POROSITY AND 'ORIGINAL' POROSITY.

19,20- BOTH SHOW GAPS INTERPRETED AS 'ORIGINAL' POROSITY.

PE905868

This is an enclosure indicator page.
The enclosure PE905868 is enclosed within the container PE902502 at this location in this document.

The enclosure PE905868 has the following characteristics:

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BASIN = OTWAY BASIN
PERMIT = PEP/105
TYPE = WELL
SUBTYPE = PHOTOMICROGRAPH
DESCRIPTION = Photomicrographs of core 913.48m; no.'s 17, 18, 19 & 20; (from appendix 11--Petrology--of WCR) for Lindon-1
REMARKS = page contains 4 phototgraphs
DATE_CREATED =
DATE_RECEIVED =
W_NO = W841
WELL_NAME = LINDON-1
CONTRACTOR =
CLIENT_OP_CO = BEACH PETROLEUM NL.

(Inserted by DNRE - Vic Govt Mines Dept)

17

18

19

20

PHOTOMICROGRAPHS

CORE 914.75m

21,22. MAGNIFICATION 35x

23,24. MAGNIFICATION 140x

21,22. SHOWS LOW POROSITY AREAS

23. SHOWS PHYLLOSILICATE GRAIN, WITH POSSIBLE 'DEHYDRATION' CRACK AROUND ITS EDGE.

24. SHOWS HIGH POROSITY AREA ENCLOSED BY CLOSELY PACKED GRAINS.

PE905869

This is an enclosure indicator page.
The enclosure PE905869 is enclosed within the container PE902502 at this location in this document.

The enclosure PE905869 has the following characteristics:

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PERMIT = PEP/105
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SUBTYPE = PHOTOMICROGRAPH
DESCRIPTION = Photomicrographs of core 913.48m; no.'s 21, 22, 23 & 24; (from appendix 11--Petrology--of WCR) for Lindon-1
REMARKS = page contains 4 phototgraphs
DATE_CREATED =
DATE_RECEIVED =
W_NO = W841
WELL_NAME = LINDON-1
CONTRACTOR =
CLIENT_OP_CO = BEACH PETROLEUM NL.

(Inserted by DNRE - Vic Govt Mines Dept)

21

22

23

24

RESULTS FROM POINT. COUNTING.

CORE 3 - 913.48m

QUARTZ GRAINS	46.0%
PHYLLOSILICATE GRAINS	3.4%
PHYLLOSILICATE MATRIX	35.6%
CARBONATE CEMENT	5.8%
POROSITY	9.2%

CORE 5 - 914.09m

QUARTZ GRAINS	57.0%
PHYLLOSILICATE GRAINS	2.8%
PHYLLOSILICATE MATRIX	30.2%
CARBONATE CEMENT	1.6%
POROSITY	8.4%

CORE 7 - 914.75m

QUARTZ GRAINS	49.6%
PHYLLOSILICATE GRAINS	1.6%
PHYLLOSILICATE MATRIX	38.0%
CARBONATE CEMENT	5.8%
POROSITY	3.0%

UNIVERSITY OF MELBOURNE

Chairman: Dr. R.R. Keays

DEPARTMENT OF GEOLOGY
Parkville, Victoria, 3052, Australia Telephone 345 1844
Telex: AA35185

8th May, 1984

Mr. S. Guba,
Beach Petroleum,
P.O. Box 360,
CAMBERWELL, VIC. 3124.

9 MAY 1984

Dear Mr. Guba,

An examination of the three core specimens submitted shows the following mineralogical nature of the clay fraction.

All three are poorly crystalline and there is random interstratification of the clay mineral components. The predominant clay mineral is kaolinite, very poorly crystalline (disordered) in No. 3 and increasing quite markedly in ordering for No. 5 with No. 7 slightly better still. The difference between 3 and 7 is most noticeable. There are indications of chlorite in No. 3 and No. 7, but none in No. 5. There is a variation is smectite content ; none in No. 3, indications in No. 5 and definite in No. 7.

Because of the distinct difference in crystallinity of No. 3, it should behave quite differently from 5 and 7 as far as water holding capacity is concerned.

Yours sincerely,

R.J. McLaughlin

R.J. McLaughlin
Reader in Geology

SAMPLE NO	DRILLERS DEPTH	CORRECTED DEPTH (correction +2.5m to Drillers depths)
3	913.48	915.98
5	914.09	916.59
7	914.75	917.25

STUDY OF THE PEBBLE POINT FORMATION LITHOLOGY AT LINDON NO. 1 CORE NO. 1 USING X-RAY DIFFRACTION PATTERNS (XRD) AND SCANNING ELECTRON MICROSCOPE (SEM) IN COMBINATION. 27/7/84

INTRODUCTION

A number of questions remained unresolved after the completion of earlier petrographic studies on the Pebble Point Formation at Lindon No. 1:-

1. What is the composition of the rim/stain/coat noted on the quartz grains in micrographs of thin sections?

2. What is the composition of the 'clay grains' described in earlier work?

3. Is there a difference in composition between the clay grains and clay matrix?

4. Is a quantitative evaluation of the presence of smectite possible?

5. Was the earlier clay identification study carried out solely on the clay matrix? It was suspected that the sonic disaggregation method used would not have brought the clay grains into the suspension, in liquid, necessary for examination.

6. Does the siderite show evidence of primary or secondary development?

RESULTS

Plug No. 3 Depth 913.48 m (K.B.)

Dominant clay types are chlorite and smectite. These were identified on the basis of XR diffraction patterns which recorded them as Mg, Al, K, Fe silicates. Some clay contained a high Ca fraction suggesting smectite. Iron rich chlorite was also in evidence with typical rosette shaped forms occurring as coating on quartz grains (and therefore lining pore spaces).

Coating, on some quartz grains, high in iron content was noted. Further time consuming sample preparation would be required to distinguish the coating as iron oxide or iron carbonate (siderite). A definitive crystal habit was not present. The same quartz grain was also coated with a trace of calcium phosphate

White crystalline samples were identified as silicates high in Al alone. The diagnostic booky habit indicated the mineral was kaolin occurring in ordered lattice form. Kaolin was previously described as the dominant clay type of the matrix in a clay analysis carried out by Dr. McLaughlin . Crystalline kaolin is present in trace amounts in Sample No. 3.

Disordered lattice-form kaolin may indeed occur in abundance, however confirmation by SEM was not possible due to its typical lack of diagnostic habit. Randomly taken XRD patterns suggest chlorite and smectites predominate.

Plug No. 5 Depth 914.09 m (K.B.)

Three specimens of clay were examined by SEM. The first was taken from a cavity moulded by a quartz grain which had been removed. The clay occurred as a waxy yellow-green matrix. The remaining two samples were clay flakes lifted from quartz grain surfaces.

In each case the high Ca content in the Al, Mg, Fe silicates combined with a webby form strongly suggests a smectite clay is present.

.../3

RESULTS - Continued

Plug No. 5 - Continued

The composition of the oolites with distinctly concentric layers, the clay coating on quartz grain surfaces (showing artificial porosity with clay dehydration and shrinkage) and the clay matrix iteself are all iron aluminium silicate. Variations in other metal elements occur. The presence of iron rich aluminium silicates with Mg, K, and a trace Ti in the oolites was noted and points to an iron rich chlorite type such as chamosite. The trend of Mn and Ca in the clay coating minerals points to the smectite group.

Plug No. 7 - Depth 914.75 m (K.B.)

A sample of clay found in the less friable Sample No. 7 as a medium grey, hard matrix gave an XRD pattern of an iron rich chlorite and the flaky, webby, crenulated form of a smectite.

Siderite with well developed rhombohedral habit is seen within pores of the clay matrix. This suggest secondary crystal growth.

A variation in composition occurs in the dark brown rim or staining surrounding quartz grains. Two grains simply show a high iron content. Further examination is required before the minerals can be identified as either an oxide or a carbonate. XRD patterns on a third grain clearly indicated the composition of the rim as an iron aluminium silicate.

Iron stained kaolin was also noted.

PLUG # 3

Top Photo (x 20)

Shows:

i) White crystalline Kaolinite in top right sector

ii) Dark brown stain on quartz grain in top centre right.

iii) Dominant clay matrix with some minor porosity.

Bottom Photo (x 50)

Shows:

i) Clay flakes lifting off the quartz grains which increases porosity artifically.

PE905870

This is an enclosure indicator page.
The enclosure PE905870 is enclosed within the container PE902502 at this location in this document.

The enclosure PE905870 has the following characteristics:

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CONTAINER_BARCODE = PE902502
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            BASIN = OTWAY BASIN
           PERMIT = PEP/105
             TYPE = WELL
          SUBTYPE = PHOTOMICROGRAPH
      DESCRIPTION = Core Photographs of Plug #3 (from
                    appendix 11--Petrology--of WCR) for
                    Lindon-1
          REMARKS = page contains 2 phototgraphs
     DATE_CREATED =
    DATE_RECEIVED =
             W_NO = W841
        WELL_NAME = LINDON-1
       CONTRACTOR =
     CLIENT_OP_CO = BEACH PETROLEUM NL.
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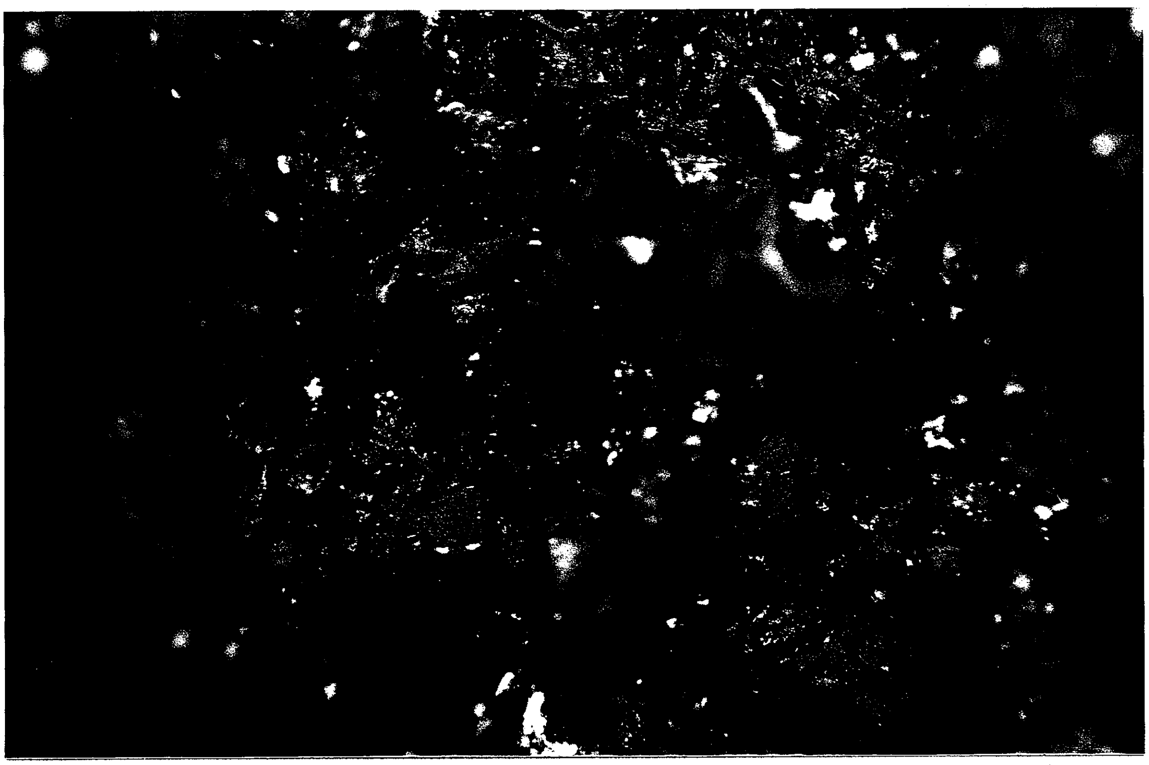
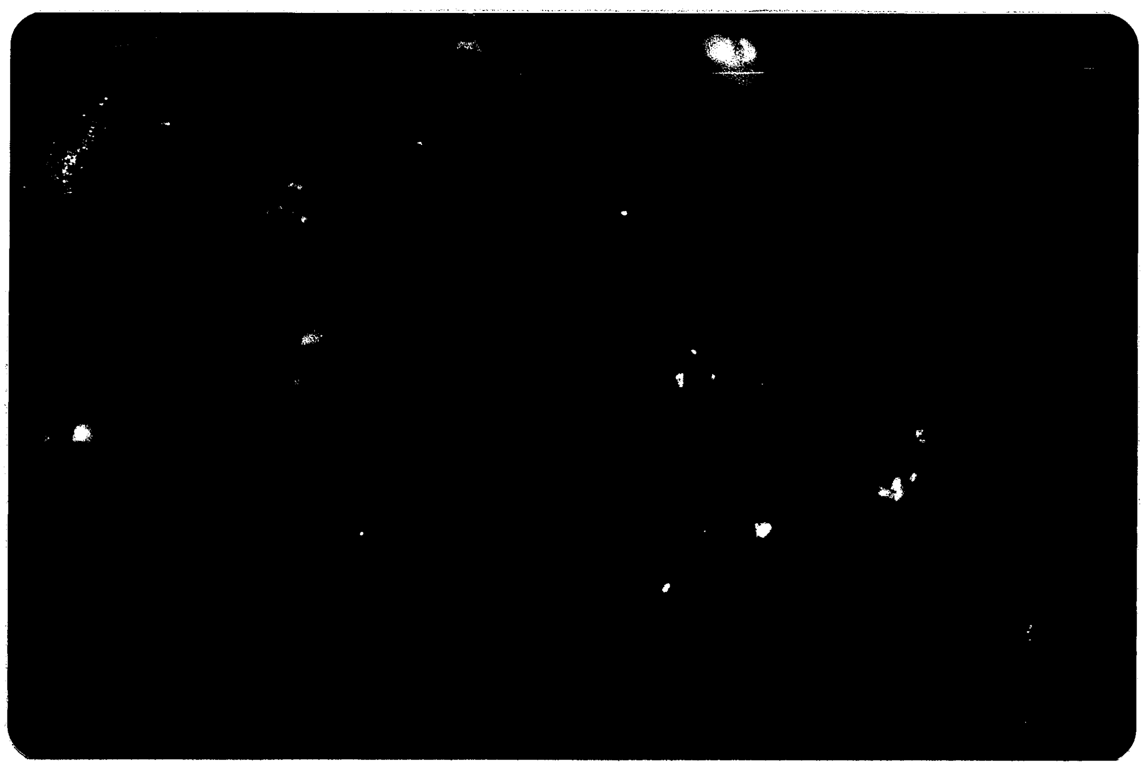
(Inserted by DNRE - Vic Govt Mines Dept)

PLUG 3





PLUG # 5

Top Photo (x 20)

Shows:

i) Moulded cavity in centre of field lined by a waxy, green, yellow clay matrix formed by a quartz grain which subsequently fell away. Clay is a chlorite or smectite.

ii) Abundant grey green clay chlorite/smectite coating quartz grains.

Bottom Photo (x 50)

Shows:

i) Artificial porosity resulting from clay dehydration and shrinkage.

PE905871

This is an enclosure indicator page.
The enclosure PE905871 is enclosed within the container PE902502 at this location in this document.

The enclosure PE905871 has the following characteristics:

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CONTAINER_BARCODE =	PE902502
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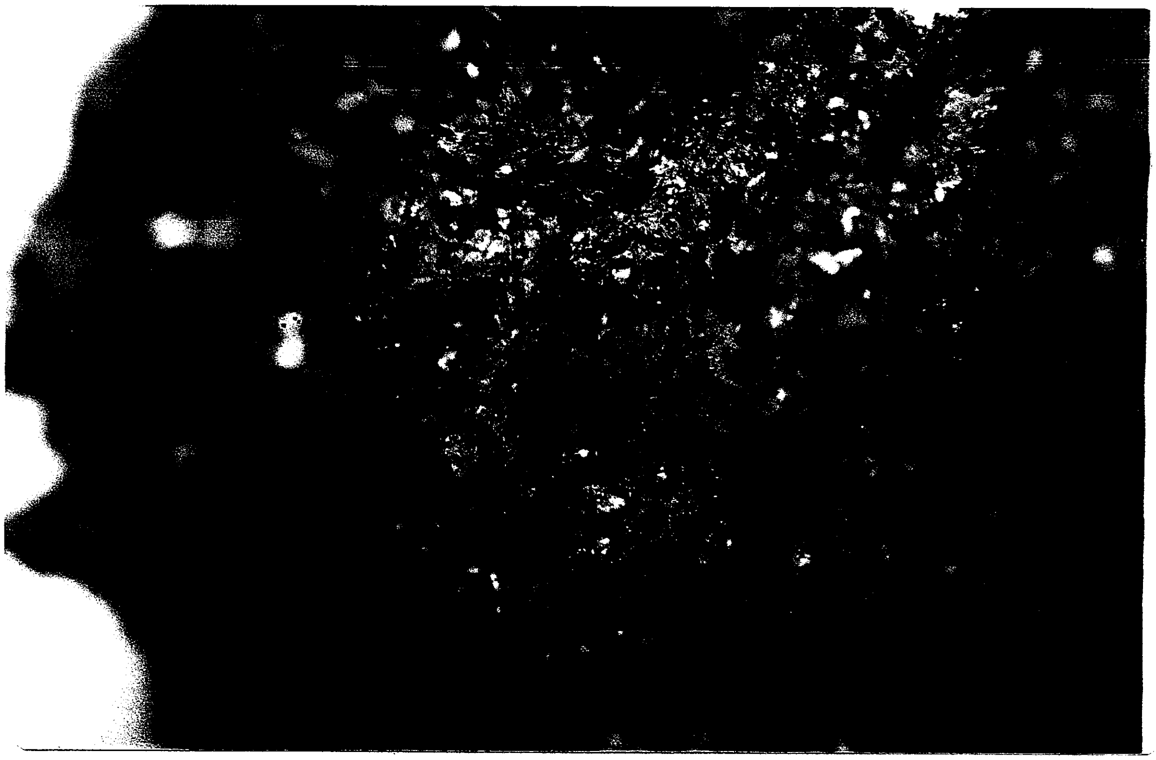
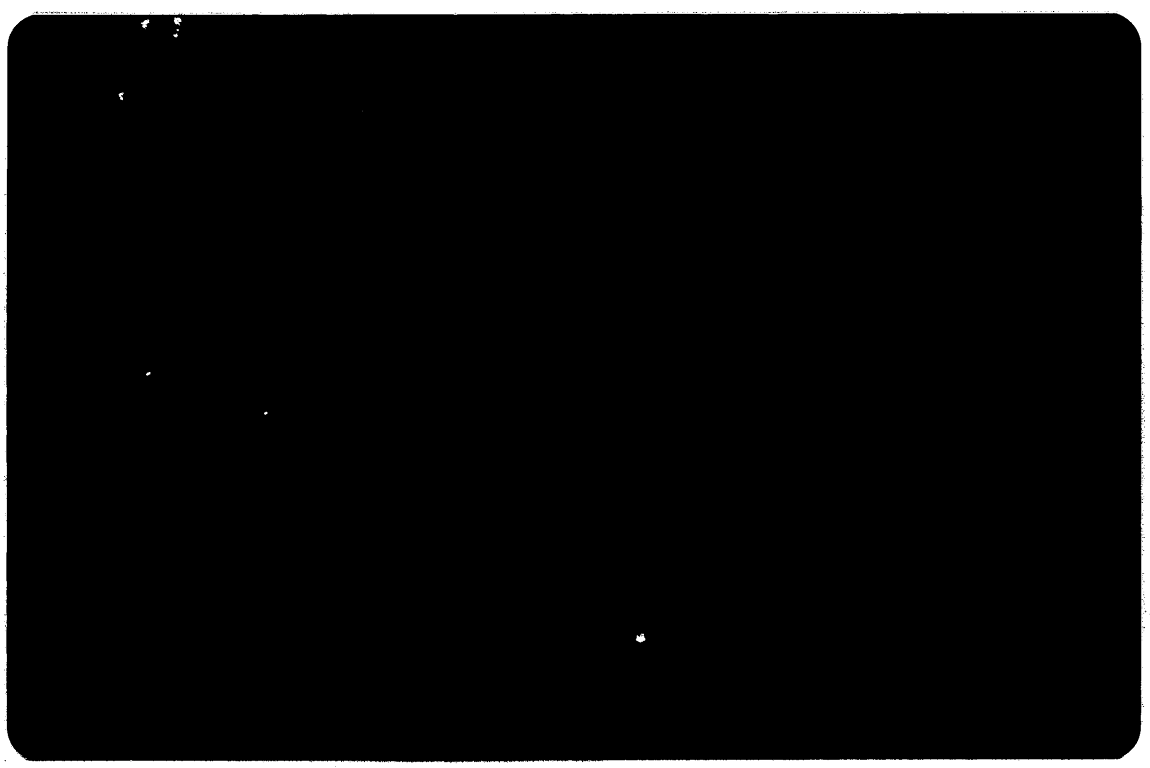
BASIN =	OTWAY BASIN
PERMIT =	PEP/105
TYPE =	WELL
SUBTYPE =	PHOTOMICROGRAPH
DESCRIPTION =	Core Photographs of Plug #5 (from appendix 11--Petrology--of WCR) for Lindon-1
REMARKS =	page contains 2 phototgraphs
DATE_CREATED =	
DATE_RECEIVED =	
W_NO =	W841
WELL_NAME =	LINDON-1
CONTRACTOR =	
CLIENT_OP_CO =	BEACH PETROLEUM NL.

(Inserted by DNRE - Vic Govt Mines Dept)

PLUG 5





PLUG # 7

Top Photo (x 20)

Shows:

i) Dark, grey, green, firm, chloritic/smectitic clay matrix.

ii) decrease in porosity.

Bottom Photo (x 50)

Shows:

i) Red brown crystals of iron-stained kaolin.

PE905872

This is an enclosure indicator page.
The enclosure PE905872 is enclosed within the container PE902502 at this location in this document.

The enclosure PE905872 has the following characteristics:

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CONTAINER_BARCODE = PE902502
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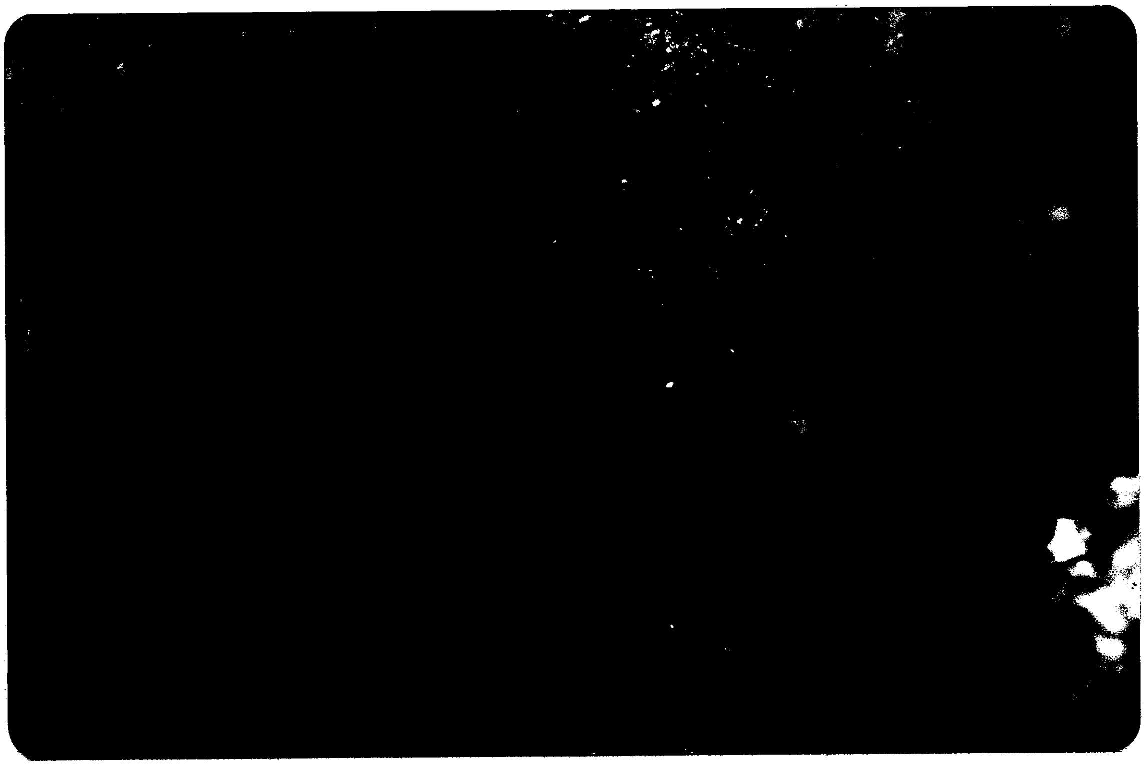
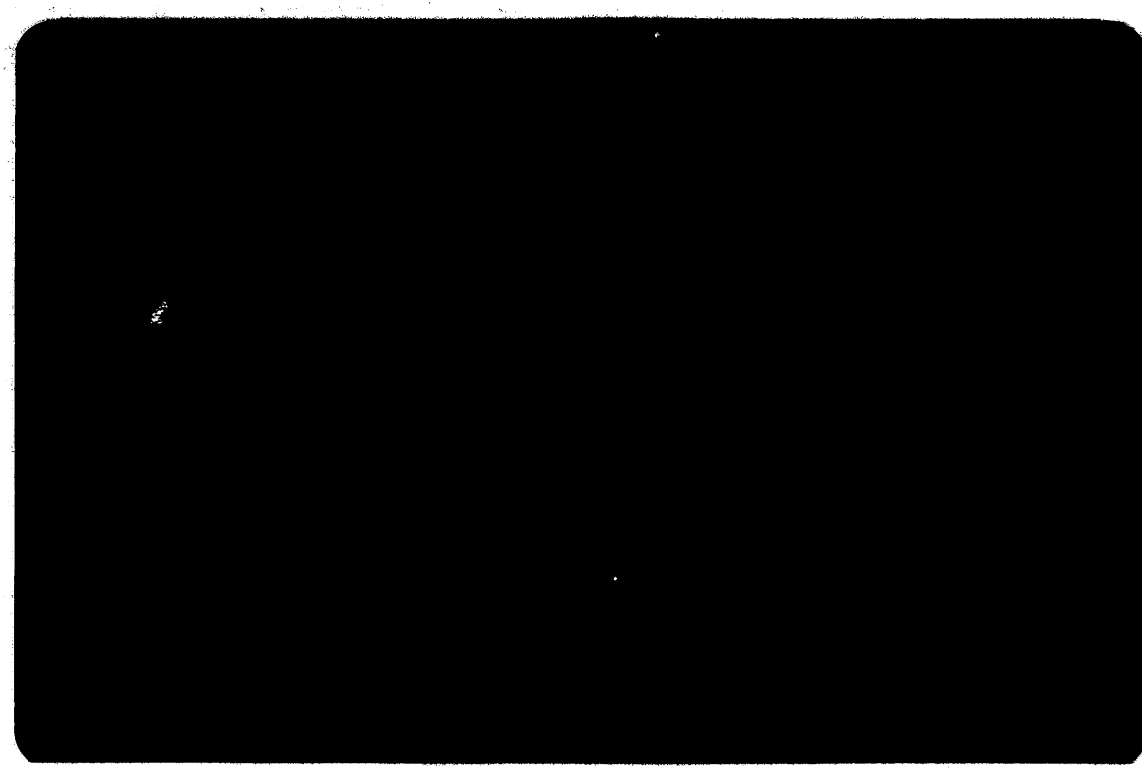
BASIN = OTWAY BASIN
PERMIT = PEP/105
TYPE = WELL
SUBTYPE = PHOTOMICROGRAPH
DESCRIPTION = Core Photographs of Plug #7 (from appendix 11--Petrology--of WCR) for Lindon-1
REMARKS = page contains 2 phototgraphs
DATE_CREATED =
DATE_RECEIVED =
W_NO = W841
WELL_NAME = LINDON-1
CONTRACTOR =
CLIENT_OP_CO = BEACH PETROLEUM NL.

(Inserted by DNRE - Vic Govt Mines Dept)

PLUG 7





DISCUSSION

The Montmorillonite (Smectite Group)

1. $\frac{1}{2}$ $(Ca, Na)_{0.67}$ $(Al, Mg, Fe)_{4-6}$ $(Si\ Al)_8$ O_{20} (OH_4) .nH2 O.

2. Specific Gravity is 2.0 - 2.7 increasing with dehydration. (Due to a high water volume decrease relative to a lesser mass decrease.)

3. As they are normally the alteration product of basic igneous rocks, they are commonly impure, iron-stained, and yellow, red, brown, or green from pale to almost black in colour.

4. The montmorillonites are all expanding clays that may enlarge in water and develop shrinkage cracks when dried.

5. Microscopically they appear, most commonly, as flakes or granules. They may also occur as finely fibrous or black and with an elongate C axis.

   Under an electron microscope they have a webby appearance with thin plates.

6. Montmorillonites are products of hydrothermal alteration and formation is favoured in alkaline solutions.

7. They may appear with Kaolin or Chlorite.

The Kaolin Group

1. $Al_2\ Si_2\ O_5\ (OH)_4$.

2. Many cations especially Na, K, Ca are absorbed by clay layers and minor Mg, Fe, Ti, may replace Al.

3. Specific Gravity 2.5 - 2.7.

.../5

DISCUSSION - Continued

The Kaolin Group - Continued

4. Kaolins are commonly white but can be strongly iron stained.

5. Kaolins are non-expanding clays.

6. Diagnostic morphology of kaolins is seldom recognised by optical means but the SEM can reveal the foliated (booklet) structure. Cleavage is not always visible.

7. Kaolins are stable, low temperature and low pressure, alteration products of felspars derived from weathering of granites and other Ca poor igneous and metamorphic rocks. Kaolins are favoured by acidic environments.

8. Kaolin is also a product of hydrothermal alteration.

The Chlorite Group

1. There are 4 series in the Chlorite Group:-

i.	$(Mg, Al)_6$	Aluminium	silicate	hydroxide
ii.	$(Fe, Al)_6$	"	"	"
iii.	$(Mg, Fe^{3+})_6$	"	"	"
iv.	$(Fe^{2+}, Fe^{3+})_6$	"	"	"

2. Specific gravity range 2.6 - 2.96

3. Identification of the clay member is beyond the scope of this study.

4. It is worth noting that chamosite compositions commonly form as oolitic pellets with concentric layers formed on a core of similar or foreign composition.

.../6

SUMMARY

1. There is sufficient evidence to believe that clays from both the smectite and the chlorite groups commonly coat the surface of quartz grains.

   The identity of the dark, brown stain/rim on some quartz grains surface cannot be distinguished (by SEM, without gold treated thin sections) beyond an iron rich oxide and/or carbonate.

2. The iron rich aluminium silicate XRD pattern of the clay grains and their common concentrically layered oolitic form suggest that they belong to the iron rich chlorite group, specifically the chamosites. However, further detailed identification of clays in this dominantly iron-rich chlorite group is beyond the scope of this report.

3. The essential mineralogical difference between the clay grains and clay matrix is that the matrix contains kaolin, smectite and iron rich chlorites whereas the grains are iron-rich chlorites.

4. XRD patterns and habit noted in this study gave stronger indications of common smectite than previously reported.

5. The previous study in fact examined the composition of the matrix to the exclusion of the clay grains which were not disaggregated during sample preparation.

6. Infilling with secondary siderite crystal growth was noted in pore spaces lined by clay matrix.

INTERPRETATION

Recent reviews indicate that chamositic multi-coated ooliths predominate characteristically in the inner shelf regimes at the end of a regressive sequence during episodes of limited sediment influx. The rate of deposition of the possibly fluvial dominant Timboon Sand Member of the deltaic Paaratte Formation that exceeded the rate of subsidence would account for regressive effects. The distinction has been made with glauconitic pellets which, in contrast, are most abundant on the middle and outer shelf. (E.g. Belfast, Mudstone Member). Glauconitic pellets are noted for their structurelessness. Furthermore, available literature confirms that wave-induced sea floor sediment motion can occur well beyond the breaker zone. This permits formation of multi-coated ooliths by gentle rolling on the sea-floor without the excessive energy of surf action that would have sorted the range of clay to coarse grain sizes.

S. Guba
27/7/84

REFERENCES

OPTICAL MINERALOGY	Phillip, R. and Griffen, D. (1981)
SEM PETROLOGY ATLAS	Welton, J.E. (1984).
GLAUCONITIC PELOIDS AND CHAMOSITIC OOIDS	Van Houten, F. and Purucker M. (1984)
COASTAL ENGINEERING.	Vol. 2. Sylvester, R. (1974)

APPENDIX 12

SIDEWALL CORE DESCRIPTIONS

NUMBER	DEPTH(M)	RECOVERY(CM)	DESCRIPTION
SWC 1	3001.5	1.0	SILTSTONE, light grey, hard, trace very finely arenaceous, occasional mica flakes. No fluorescence.
SWC 2	2980.0	0.3	SILTSTONE, light to medium green grey, very finely arenaceous, firm to hard, massive, micromicaceous, trace biotite.
SWC 3	2952.0	5.8	CLAYSTONE, medium olive grey, massive, very soft, slightly calcareous.
SWC 4	2902.5	2.0	SANDY SILTSTONE, very light grey to yellowish grey, firm, trace very finely arenaceous, abundant calcite cement, trace mica flakes, trace carbonaceous flecks, trace pyrite. Trace moderate orange pink fluor - cutitic material. Faint odour.
SWC 5	2848.0	1.8	CLAYSTONE, dark grey, soft, moderately silty, massive to slightly fissile, micromicaceous, slightly calcareous, moderately carbonaceous.
SWC 6	2752.0	NR	
SWC 7	2650.0	0.1	SILTSTONE, medium grey, firm, massive, very argillaceous, minor very fine altered feldspars, moderately
SWC 8	2449.0	1.2	CLAYSTONE, medium dark grey, firm, finely micaceous. Trace white pinpoint COAL fluor. giving very weak, streaming yellow white cut fluorescence color.
SWC 9	2352.0	NR	
SWC 10	2253.0	1.2	SILTSTONE, light medium olive grey, soft, massive trace very fine carbonaceous flecks, trace micromicaceous, slightly calcareous.

.../

NUMBER	DEPTH(M)	RECOVERY(CM)	DESCRIPTION
SWC 11	2145.0	2	SANDSTONE, light medium olive grey, soft to friable, silty to very fine, subangular, poorly sorted quartz grains, abundant argillaceous matrix, moderately calcareous, trace medium grey lithics, trace chlorite, trace biotite, trace common altered feldspars. Very poor visible porosity.
SWC 12	1959.0	1.3	SANDSTONE, light green grey, friable, very fine, subangular, moderately sorted quartz grains, abundant white clay matrix, moderate calcite cement and matrix, common medium grey lithics and altered feldspar, rare carbonaceous detritus. Very poor visible porosity.
SWC 13	1948.4	1.3	CLAYEY SANDSTONE, greenish grey, soft, very fine to coarse, subangular to subrounded, poorly sorted, quartz grains, common argillaceous matrix, grey green lithics, very poor visible porosity. No fluorescence.
SWC 14	1946.0	1.9	SANDSTONE, light grey mottled, friable, fine grain, subangular, moderately sorted quartz grains, abundant white to light grey argillaceous matrix, slightly calcareous, weak silica cement, abundant medium grey lithics, abundant altered feldspar, trace chlorite. Very poor visible porosity. No fluorescence.
SWC 15	1850.0	2.8	SANDSTONE, light medium grey, friable, very fine, subangular, moderately sorted quartz grains, abundant white to light grey argillaceous matrix, weak silica cement, abundant medium grey lithics, abundant altered feldspar, trace chlorite. Very poor visible porosity. No fluorescence.

.../

NUMBER	DEPTH(M)	RECOVERY(CM)	DESCRIPTION
SWC 16	1752.0	1.7	CLAYSTONE, light medium olive grey, massive to subfissile, slightly micromicaceous, very fine silt size fraction.
SWC 17	1651.0	3.0	SANDSTONE, light olive grey, friable, very fine, subangular, moderately sorted quartz grains, abundant white clay matrix, moderate silica cement/matrix, common medium grey lithics, minor chlorite, minor carbon-aceous detritus, moderate partially altered feldspars. Very poor visible porosity. No fluorescence.
SWC 18	1545.0	3.4	SANDSTONE, light to medium olive grey, friable, very fine to fine; dominantly very fine, subangular, moderately sorted quartz grains, common medium grey to white argillaceous matrix, slightly calcareous in part, weak silica cement, common medium grey lithics, trace chlorite, rare carbonaceous detritus, common altered feldspars. Very poor visible porosity. No fluorescence.
SWC 19	1451.0	4.3	SANDSTONE, light olive grey, friable, very fine to fine; dominantly fine grain, sub-angular, moderately sorted, quartz grains common very light to white argillaceous matrix common medium grey lithics, common partially altered feldspars, rare mica, common chlorite, very slightly calcareous, very weak silica cement. Very poor visible porosity. No fluorescence.
SWC 20	1246.0	4.0	SANDSTONE, light olive grey, friable, very fine subangular, moderately sorted quartz, common white to very light grey green argillaceous matrix, slightly calcareous, weak silica cement, minor medium grey lithics (trace red grains), common partially altered feldspars. Very poor visible porosity. No fluorescence.

.../

NUMBER	DEPTH(M)	RECOVERY(CM)	DESCRIPTION
SWC 21	1237.5	3.9	SILTSTONE, light medium olive grey, firm, massive, minor very fine arenaceous, moderately argillaceous, minor very fine red grains, rare carbonaceous detritus.
SWC 22	1223.1	5.0	CLAYSTONE, medium dark grey, massive to sub-fissile, moderately silty, micromicaceous, very slightly calcareous, minor medium to dark green glauconite.
SWC 23	1216.5	4.6	CLAYSTONE, medium to dark grey to medium dark green grey, firm, massive, slightly silty, minor carbonaceous detritus, minor very fine mica, common medium dark green chlorite/glauconite.
SWC 24	1206.8	5.1	CLAYSTONE, medium dark grey to medium dark green grey, massive to subfissile, micro-micaceous, slightly carbonaceous, common dark green chlorite/glauconite.
SWC 25	1115.0	5.4	SANDSTONE, medium brown grey, fine to medium, dominantly fine, friable to loose, sub-angular to subrounded, moderately sorted quartz, moderate medium brown argillaceous matrix, rare lithic fragments; medium grey, rare red grains, minor glauconite, poor to fair visible porosity. No fluorescence.
SWC 26	996.0	4.9	SANDSTONE, very light grey, friable to loose, fine to medium grain; dominantly medium, sub-angular to subrounded, poor to moderately sorted, quartz grains, trace to moderate white argillaceous matrix, minor carbonaceous detritus, fair visual porosity. No fluorescence

.../

NUMBER	DEPTH(M)	RECOVERY(CM)	DESCRIPTION
SWC 27	931.6	4.6	SANDSTONE, medium dark grey, friable, very fine to coarse; dominantly very fine, subangular to dominantly subrounded, very poorly sorted quartz grains, abundant medium brown to dark grey, very carbonaceous argillaceous matrix, slightly calcareous. Very poor visible porosity. No fluorescence.
SWC 28	906.5	2.4	CLAYEY SANDSTONE, light brown, hard, fine to coarse, dominantly medium, subangular to subrounded, very poorly sorted, clear to white quartz grains, trace calcite cement, abundant light brown silt matrix. Very poor visible porosity. 5% patchy light gold fluorescence giving slow streaming milky white cut to crush cut.
SWC 29	873.0	4.8	CLAYSTONE, medium dark brown, grey, massive, silty in part, slightly micromicaceous, moderately carbonaceous, moderately calcareous.
SWC 30	860.0	5.1	SANDSTONE, light medium grey green, friable, very fine, subangular, moderately sorted quartz grains, abundant light grey to light green grey, argillaceous matrix, moderately calcareous interlaminated with CLAYSTONE, medium dark brown grey, firm, slightly micromicaceous, massive to slightly subfissile, moderately carbonaceous, moderately calcareous.

APPENDIX 13

SOURCE ROCK STUDY

Lindon 1

KEIRAVILLE KONSULTANTS PTY. LTD.

7 DALLAS STREET,
KEIRAVILLE, N.S.W.
AUSTRALIA, 2500

TELEPHONE : 042-299843
INTERNATIONAL : 61-42-299843

RECEIVED -6 JAN 1984

DGL	RL
AS	
SC	

D.G. Langton
EXPLORATION MANAGER
Beach Petroleum No Liability
P.O. Box 360
CAMBERWELL VICTORIA 3124

Dear Doug

Please find enclosed results for the samples from Lindon No. 1 which we received on Saturday December 31. The fifth sample was a duplicate of 19279, but dried at the rig. 19279 was received as unwashed cuttings and dried here. We were able to wash and dry the unwashed sample sufficiently rapidly to be able to mount it at the same time as the other samples. This sample was determined first and the sample made from the dried cuttings was used only the check for major differences - there were none. The well appears to be within the liquids window, but the exinite content is relatively low. The main zone of catagenic methane generation has not yet been reached. The sample from the Dilwyn contains some relatively high rank reworked coal, suggesting a source provenance including some older more highly coalified sequences.

An account is also enclosed. I trust that this meets with your approval. If it raises any problems please contact me.

Yours sincerely

Alan Cook

A.C. Cook
Encl

LINDON No 1

K.K. No.	Depth (m)	$\bar{R}_V max$	Range	N	Exinite Fluorescence (Remarks)
19277	2060 Ctgs T.O.C. 0.60	0.61	0.52–0.72	12	Sparse sporinite, yellow to dull orange, rare liptodetrinite, orange to dull orange, rare phytoplankton, orange, rare resinite, yellow, rare cutinite, orange, vitrinite abundant in coal, weak brown. (Siltstone>sandstone>claystone>coal. Coal rare, clarodurite. D.o.m. sparse, I>V>E. Inertite, rare to sparse, vitrinite and exinite, rare, Some of the vitrinite may be reworked but reworking does not appear to have resulted in a higher reflectance, Rare pyrite.)
19714	2290 Ctgs T.O.C. 1.81	0.69	0.57–0.83	25	Common sporinite, dull yellow to dull orange, sparse to common cutinite, orange to brown, sparse suberinite, brown, sparse phytoplankton, yellow to orange, rare resinite, bright yellow, rare fluorinite, bright green. (Claystone>coal>siltstone. Coal abundant, V>E>I, duroclarite>vitrite>clarite>fusite. D.o.m. common, E>I>V. Exinite common, inertinite sparse, vitrinite rare. Sparse pyrite.)
19715	2460 Ctgs T.O.C. 1.14	0.68	0.55–0.79	18	Common sporinite and rare cutinite, orange to dull orange, common phytoplankton, yellow to orange, Sparse suberinite, brown. (Siltstone>claystone>sandstone. D.o.m. abundant, E>I>V. Exinite abundant, inertinite common, vitinite sparse. Abundant carbonate and iron oxides. Sparse pyrite.)
19716	2690 Ctgs T.O.C. 3.59	0.76	0.54–0.92	25	Common sporinite, orange to dull orange, sparse cutinite, dull orange to brown. (Claystone>siltstone>coal>shaly coal. Shaly coal rare, V>I>E. Coal abundant, V>E>I, vitrite>duroclarite>fusite>clarite. D.o.m. abundant, E>I>V, all maceral groups common. Common carbonate. Sparse carbonate.)
19717	2800 Ctgs T.O.C. 2.12	0.82	0.70–0.96	25	Sparse sporinite, orange to dull orange, rare cutinite, dull orange. (Claystone>siltstone>coal. Coal sparse, V>I>E, vitrite>fusite>clarodurite. D.o.m. common, I>V>E. Inertinite and vitrinite common, exinite sparse. Abundant carbonate. Sparse pyrite.)
19279	2900 Ctgs T.O.C. 6.05	0.87	0.78–0.93	25	Sporinite rare in coal, weak brown, abundant vitrinite, weak brown. (Sandstone>siltstone>shaly coal>claystone>coal. Coal rare, vitrite>inertite, V>I>E. D.o.m. abundant, V>I. Vitrite and inertite abundant, exinite absent as d.o.m. Rare pyrite.)
					CRAYFISH FORMATION
19718	2952 SWC3 T.O.C. 1.80	0.81	0.75–0.88	7	Rare sporinite and cutinite, orange, rare phytoplankton, yellow. Claystone>>coal. Coal rare, vitrite. D.o.m. sparse, I>V>E. Inertinite sparse, vitrinite and exinite rare. Sparse pyrite.)
19719	3010 Ctgs T.O.C. 1.84	0.86	0.70–0.95	25	Sparse sporinite, dull orange to brown, sparse suberinite, brown, rare cutinite, orange to dull orange. (Siltstone>claystone>coal. Coal abundant, V>>E>I, vitrite>duroclarite>clarite. D.o.m. sparse, I>V>E. Inertinite sparse, vitrinite and exinite rare. Abundant carbonate. Sparse pyrite.)

LINDON No 1

K.K. No.	Depth (m)	$\bar{R}_V$max	Range	N	Exinite Fluorescence (Remarks)
					DILWYN FORMATION
19275	630 Ctgs	0.38	0.32-0.47	27	Rare sporinite, yellow to orange, rare cutinite yellow, rare phytoplankton, greenish yellow, rare suberinite, dull orange. (Sandstone>>siltstone>shaly coal>coal. Coal rare, vitrite. D.o.m. common, but mostly confined to shaly coal and claystone matrix in sandstone, V>I>E. Vitrite common, inertite and exinite rare, common pyrite.)
		T.O.C. 1.01			
					PEMBER FORMATION
19707	860 SWC30	0.37	0.25-0.45	25	Sparse sporinite, yellow to dull orange, rare cutinite, yellow orange to orange, rare resinite, bright yellow. (Siltstone. D.o.m. common, V>I>E. Vitrinite common, inertinite and exinite sparse. Sparse carbonate. Abundant pyrite.)
		T.O.C. 1.82			
19708	906.5 SWC28	-	-	-	No fluorescing exinite. (Sandstone. D.o.m. absent. Abundant carbonate. Common pyrite.)
		T.O.C. 0.59			
					BELFAST MUDSTONE MEMBER
19709	1210 Ctgs	0.39	0.32-0.47	20	Sparse phytoplankton, green yellow to orange, rare sporinite, dull orange, rare cutinite and ?tasmanitid, orange. (Claystone>siltstone>sandstone. D.o.m. abundant, I>V>E. Inertinite abundant, cutinite common, exinite sparse. Abundant carbonate. Sparse ?glauconite. Abundant pyrite.)
		T.O.C. 1.76			
19710	1230 Ctgs	0.38	0.31-0.44	6	Rare sporinite, orange, rare cutinite, yellow, rare ?phytoplankton, green yellow to yellow orange, rare fluorinite, green. (Sandstone>>claystone>coal. Coal rare, V>I>E, Vitrite>duroclarite. D.o.m. sparse, I>E>V. Inertinite sparse, exinite and vitrinite rare. Sparse carbonate and pyrite.)
		T.O.C. 0.43			
					EUMERALLA FORMATION
19711	1250 Ctgs	0.45	0.40-0.53	6	Common phytoplankton, green yellow to orange. (Sandstone> siltstone>claystone. D.o.m. common, E>I>V. Exinite common, inertinite sparse, vitrinite rare. Limestone present. Sparse carbonate. Abundant pyrite.)
		T.O.C. 0.56			
19276	1340 Ctgs	0.43	0.38-0.57	19	Rare to sparse sporinite, yellow to orange, rare lipto-detrinite, yellow to orange, rare phytoplankton, yellow. (Siltstone>sandstone>claystone>coal>shaly coal. Coal sparse, vitrite. D.o.m sparse, I>V>E. Inertinite and vitrinite sparse, exinite rare to sparse. Some of the vitrinite may be reworked. Rare pyrite.)
		T.O.C. 1.44			
19712	1560 Ctgs	0.43	0.35-0.56	10	Common phytoplankton, green yellow to yellow orange, sparse sporinite, yellow to orange, rare cutinite, orange to dull orange, rare resinite, green. (Claystone> siltstone>coal. Coal rare, vitrite. D.o.m. common, E>I>V. Exinite common, inertinite and vitrinite sparse. Common carbonate. Rare ?glauconite. Abundant pyrite.)
		T.O.C. 0.58			
19713	1760 Ctgs	0.42	-	1	Sparse to common phytoplankton, yellow to dull orange, rare sporinite, yellow to orange, rare cutinite, orange to dull orange brown. (Siltstone>claystone>sandstone. D.o.m. common, E>I>V. Exinite common, inertinite sparse, vitrinite rare. Sparse carbonate and pyrite.)
		T.O.C. 0.38			

A/V1

LINDON No 1

K.K. No.	Depth (m)	$\bar{R}_v$max	Range	N	Exinite Fluorescence (Remarks)
					DILWYN FORMATION
19275	630 Ctgs	0.38	0.32-0.47	27	Rare sporinite, yellow to orange, rare cutinite yellow, rare phytoplankton, greenish yellow, rare suberinite, dull orange. (Sandstone>>siltstone>shaly coal>coal. Coal rare, vitrite. D.o.m. common, but mostly comfirmed to shaly coal and intensified claystone matrix in sandstone, V>I>E. Vitrite common, inertite and exinite rare, common pyrite.)
	T.O.C. 1.01				
					EUMERALLA FORMATION
19276	1340 Ctgs	0.43	0.38-0.57	19	Rare to sparse sporinite, yellow to orange, rare liptodetrinite, yellow to orange, rare phytoplankton, yellow. (Siltstone>sandstone>claystone>coal>shaly coal. Coal sparse, vitrite. D.o.m sparse, I>V>E. Inertinite and vitrinite sparse, exinite rare to sparse. Some of the vitrinite may be reworked. Rare pyrite.)
	T.O.C. 1.44				
19277	2060 Ctgs	0.61	0.52-0.72	12	Sparse sporinite, yellow to dull orange, rare liptodetrinite, orange to dull orange, rare phytoplankton, orange, rare resinite, yellow, rare cutinite, orange, vitrinite abundant in coal, weak brown. (Siltstone>sandstone>claystone>coal. Coal rare, clarodurite, I>V>E. Inertite, rare to sparse, vitrinite and exinite, rare. Some of the vitrinite may be reworked but reworking does not appear to have resulted in a higher reflectance. Rare pyrite.)
	T.O.C. 0.60				
19279	2900 Ctgs	0.87	0.78-0.93	25	Sporinite rare in coal, weak brown, abundant vitrinite, weak brown. (Sandstone>siltstone>shaly coal>claystone> coal. Coal rare vitrite>inertite V>I>E. D.o.m. abundant, V>I. Vitrite and inertite abundant, exinite absent as D.o.m. Rare pyrite.)
	T.O.C. 6.05				

Total Organic Carbon Results for Lindon No. 1

Sample No.	TOC
19275	1.01
19276	1.44
19277	0.60
19279	6.05

Total Organic Carbon Results for Lindon No. 1

Sample No.	TOC
19707	1.82
19708	0.59
19709	1.76
19710	0.43
19711	0.56
19712	0.58
19713	0.38
19714	1.81
19715	1.14
19716	3.59
19717	2.12
19718	1.80
19719	1.84

LINDON - 1

APPENDIX 14

VELOCITY SURVEY

SONIC CALIBRATION AND GEOGRAM REPORT

BEACH PETROLEUM N.L.

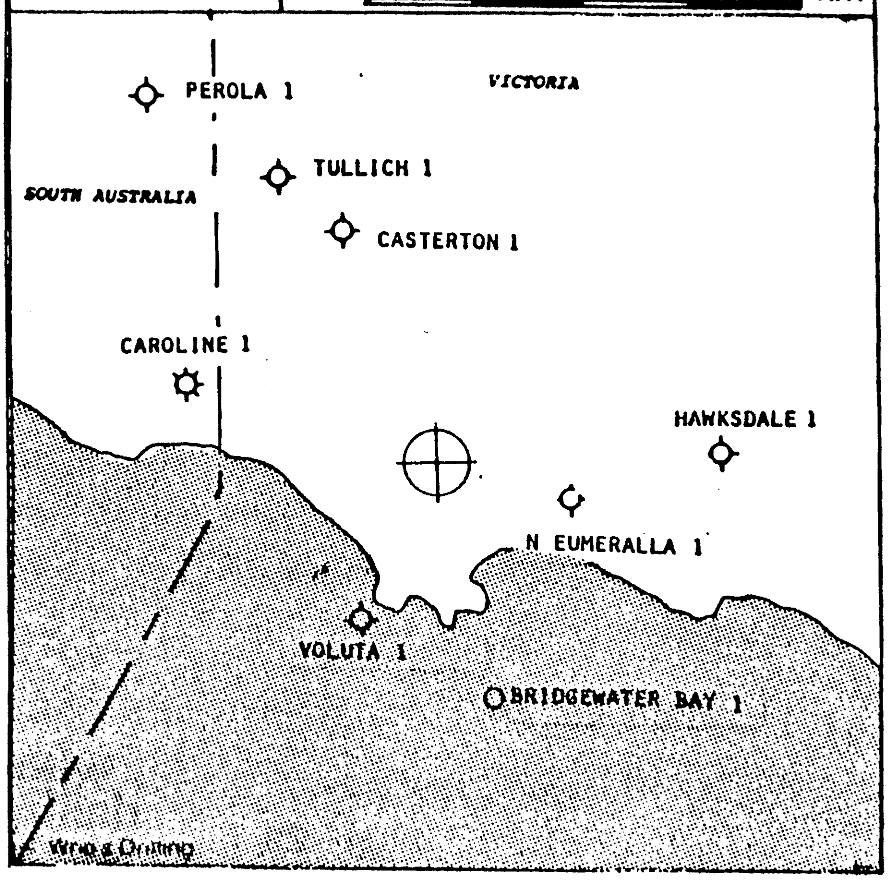
LINDON #1

SONIC CALIBRATION AND GEOGRAM REPORT

COMPANY	:	BEACH PETROLEUM NL
WELL	:	LINDON #1
LEASE	:	VICTORIA
FIELD	:	WILDCAT
COUNTRY	:	AUSTRALIA
COORDINATES	:	38DEG 04' 05.5"S 141DEG 30' 54.7"E
RIG	:	RICHTER 14
ELEVATIONS	:	KELLY BUSHING AT 69.9M AMSL
DATE OF SURVEY	:	3 JANUARY 1984

LINDON 1

LOCATION	CO-ORDINATES
	$38^{\circ}04'05''S$ $141^{\circ}30'55''E$ PERMIT PEP-105 TD 2500m GL 63m KB 70m
SCALE	0 50 100 km



CONTENTS

SUMMARY

A velocity check shot survey was conducted in the LINDON #1 well on January 3, 1984. Twenty nine levels plus a weathered zone survey were shot using an airgun source. The results from these shots have been used in the calibration of the sonic log. Seismic survey data over Lindon #1 has been corrected to a nominal mean sea level datum to match SRD (69.9m below KB).

Using the corrected sonic log a synthetic seismic section has been generated using a Klauder wavelet of 12-60 Hz.

DATA ACQUISITION

FIELD EQUIPMENT

Energy Source	:	Bolt airgun (model 1900B) 120 cu.in.
Source Offset	:	65m
Source Depth	:	60.3m above MSL (SRD)
Source Azimuth	:	160 Deg.
Reference Sensor	:	Accelerometer
Sensor Offset	:	65m
Sensor Depth	:	60.3m above MSL (SRD)
Downhole Geophone	:	Geospace HS-1 High temperature (350 Deg. F), Coil Resistance 225 + 10%, Natural Frequency 8-12 Hz, Sensitivity 0.45 V/in/sec. Maximum tilt angle 60 Deg. Min.

PROCESSING PARAMETERS

Seismic Reference Datum (SRD)	:	MSL
Elevation SRD	:	MSL
Elevation Kelly Bushing	:	69.9m AMSL
Elevation Ground Level	:	63.3m AMSL
Total Depth	:	3011M below KB
Sonic Log Interval	:	101 - 3010m below KB

SHOT DATA

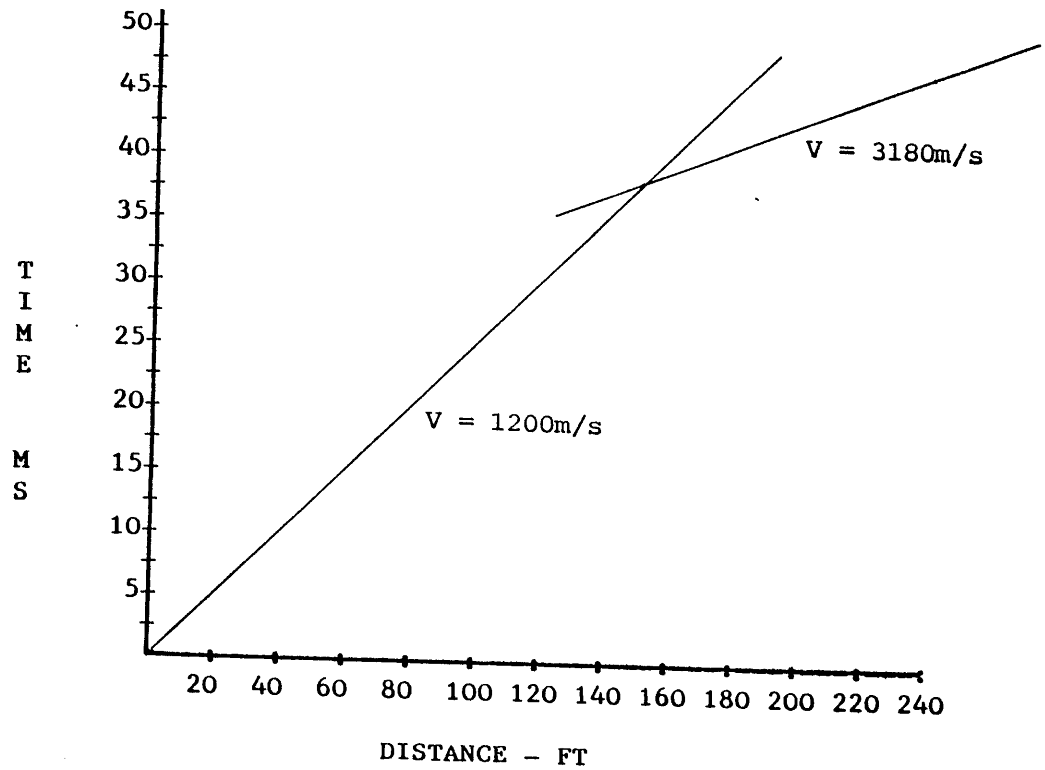
Level Depth (m below KB)	Stacked Shots	Rejected Shots	Quality	Comment
3010	3	0	Good	
2964	4	0	Good	
2700	1	0	Good	
2433.5	3	0	Good	
1900	2	0	Good	
1750	1	0	Good	
1550	1	0	Good	
1234	1	0	Good	
1227	1	0	Poor	
1197	1	0	Good	
948.5	1	0	Good	
910	1	1	Good	
845	1	0	Good	
665	1	0	Good	
504	1	0	Good	
484	1	0	Good	
394	0	1	Poor	
348	1	0	Good	
186	2	0	Poor	
103	2	0	Good	
71.8	0	1	Poor	
69.8	1	0	Good	
67.8	0	1	Poor	
50	0	1	Poor	
40	0	1	Poor	
30	0	1	Poor	
25	0	1	Poor	
20	0	1	Poor	

A total of 29 check levels were shot with the number of stacked and rejected shots for each level being shown in the table above. All levels up to 69.8m were used in the computations and calibration of the sonic log.

WEATHERED ZONE SURVEY

Eight shots were taken to determine the weathered zone velocity. Offsets and transit times are tabulated below along with a plot of the weathered zone data.

SHOT	OFFSET (FEET)	TRANSIT TIME (MSEC)
1	30	8.5
2	60	15.0
3	90	23.4
4	120	30.5
5	150	40.0
6	180	41.0
7	210	43.4
8	240	46.9



SRD: THE SRD USED WAS SEA LEVEL.

PROCESSING

CORRECTION TO DATUM

Seismic reference Datum (SRD) is at Mean Sea Level. The airgun was positioned 60.3m above SRD and the shot at SRD was used as a reference point.

VELOCITY MODELLING

Interval velocities above the sonic log were taken as shown below, intervals based on the transit times derived from the good shots at 69.8 and 103m. Depths stated are referenced to the Kelly bushing.

69.8m ______________________ MSL

3177 m/s

103m ______________________

SONIC CALIBRATION RESULTS

The top of the sonic log is chosen as the origin for the calibration drift curve. All drift measurements are relative to this point.

The drift curve indicates a number of corrections to be made to the sonic log. Block shifts of 6.05us/ft, 2.32us/ft, 2.13us/ft, 2.87us/ft, 5.38us/ft, and 3.51us/ft have been applied over the intervals 69.8-407.5m, 407.5-709.6m, 709.6-910m, 910-1930m, 1930-2429m, and 2429-3010m respectively. These depths are referenced to KB.

The adjusted sonic curve is considered to be the best result using the available data.

INTERVAL VELOCITIES

Interval velocities have been calculated and displayed using levels at MSL and a number of other formation intervals.

More detailed analysis can be found in the listings included.

Purpose: To adjust the sonic log using the vertical times obtained at each check level.

Method: A "drift" curve is obtained using the sonic log and the vertical check level times. The term "drift" is defined as seismic time (from check shots) minus sonic time (from integration of edited sonic). Commonly the word "drift" is used to identify the above difference, or to identify the gradient of drift versus increasing depth, or to identify a difference of drift between two levels.

The gradient of drift, that is the slope of the drift curve, can be negative or positive.

For a negative drift $\frac{\Delta drift}{\Delta depth} < 0$, and the sonic time is greater than the seismic time over a certain section of log.

For a positive drift $\frac{\Delta drift}{\Delta depth} > 0$, and the sonic time is smaller than the seismic time over that section of log.

The drift curve, between two levels, is then an indication of the error on the integrated sonic or an indication of the amount of correction required on the sonic to have the TTI of the corrected sonic match the check shot times.

Two methods of correction to the sonic log are used.

(a) Uniform or block shift.

This method applies a uniform correction to all sonic values over the interval. This uniform correction is applied in the case of positive drift and is the average correction represented by the drift curve gradient expressed in $\mu s/ft$.

(b) ΔT Minimum

In the case of negative drift a second method is used, called Δt minimum. This applies a differential correction to the sonic log, where it is assumed that the greatest amount of transit time error is caused by the lower velocity sections of log. Over a given interval the method will correct only Δt values which are higher than a threshold, the Δt minimum. Values of Δt which are lower than the threshold are not corrected. The correction is a reduction of the excess of Δt over Δt minimum, $\Delta t - \Delta t$ min.

$\Delta t - \Delta t$ minimum is reduced through multiplication by a reduction coefficient which remains constant over the interval. This reduction coefficient, named G, can be defined as:

$$G = 1 + \frac{Drift}{\int(\Delta t - \Delta t \text{ minimum})dZ}$$

Where drift is the drift over the interval to be corrected and the value $\int(\Delta t - \Delta t \text{ minimum})dZ$ is the time difference between the integrals of the two curves Δt and Δt minimum, only over the intervals where $\Delta t > \Delta t$ min.

Hence the corrected sonic: $\Delta t = G(\Delta t - \Delta t \text{ min}) + \Delta t \text{ min}$.

GEOGRAM PROCESSING

Two Geograms were generated using Klauder wavelet of 12-60Hz. The first two presentations are generated from SRD to 4sec and should match the surface seismic. Due to the strong reflectors above 424m the multiples are very complex. In order to improve this the last presentation was generated with this point as a reference. It needs to be shifted in order to match the surface seismic but gives a clearer view of the multiples.

Geogram processing produces synthetic seismic traces based on reflection coefficients generated from sonic and density measurements in the well-bore. The steps in the processing chain are the following:

Time to depht conversion
Generate reflection coefficients
Generate attenuation coefficients
Choose a suitable wavelet
Convolution
Output

TIME TO DEPTH CONVERSION

Open hole logs are recorded from bottom to top with a depth index. This data is converted to a two-way time index and flipped to read from top to bottom in order to match the seismic section.

REFLECTION COEFFICIENTS - ATTENUATION COEFFICIENTS

Primaries:

Sonic and density data are averaged over chosen time intervals (normally 2 or 4ms intervals). Reflection coefficients are then computed using:

$$R = \frac{\rho_2 \nu_2 - \rho_1 \nu_1}{\rho_2 \nu_2 + \rho_1 \nu_1}$$

where
- ρ_1 = density of the layer above the reflection interface
- ρ_2 = density of the layer below the reflection interface
- ν_1 = compressional wave velocity of the layer above the reflection interface
- ν_2 = compressional wave velocity of the layer below the reflection interface

This computation is done for each time interval to generate a set of primary reflection coefficients without transmission losses.

PRIMARIES WITH TRANSMISSION LOSS;

Transmission loss on two-way attenuation coefficients are computed using:

$$A_n = (1-R_1^2)(1-R_2^2)(1-R_3^2)\ldots(1-R_n^2)$$

A set of primary reflection coefficients with transmission losses is generated using:

$$\text{Primary}_n = R_n \, A_{n-1}$$

PRIMARIES PLUS MULTIPLES:

Multiples are computed from these input reflection coefficients using the transform technique from the top of the well to obtain the impulse response of the earth. The transform outputs primaries + multiples.

MULTIPLES ONLY:

By subtracting previously calculated primaries from the above result we obtain multiples only.

WAVELET

A theoretical wavelet is chosen to use for convolution with the reflection coefficients previously generated.

Choices available include:

Klauder wavelet
Ricker zero phase wavelet
Ricker minimum phase wavelet
User defined wavelet

All wavelets can be chosen with or without butterworth filtering and with user defined centre frequencies. Polarity conventions are shown in Figure 2. These Geograms were generated using a Klauder wavelet of frequency 12-60hz.

CONVOLUTION

Standard procedure of convolution of wavelet with reflection coefficients. The output is the synthetic seismic data.

GEOGRAM OUTPUT

Standard output includes the following synthetic seismograms (normal and reverse polarity):

1 - Primaries and primaries with transmission loss + 3 correlation curves GR, DT, and Reflection Coefficient.

2 - Primaries and multiples as follows:
 - Primaries
 - Primaries with transmission losses
 - Primaries and multiples
 - Multiples only

Schlumberger

WELL SEISMIC SERVICE COMPUTATION REQUEST

COMPANY: BEACH PET. CONTACT:

WELL: LINDON #1

FIELD/COUNTRY: WILDCAT/VICTORIA

LOCATION/DIVISION: SEA/ANZ

DATE WST JOB: 3 JANUARY 1984

DATE SENT: 7 JANUARY 1984

BY: S. BAKER

NUMBER OF COPIES OF RESULTS (CLIENT)

PRODUCT	REPORTS	PLOT TRANSP.	PLOT PRINT	TAPE
WSE				
WSC	3	1	3	
GEO	3	1	3	
VSP				

DATA SUPPLIED FOR INTERVALS TO BE PROCESSED

	FROM	TO
A. LOGS : DENSITY		
SONIC	101	3010
B. SHOTS	SURF	3010

UNITS: FEET ☐ METRES ☒

CLIENT TAPE: FORMAT: SEGY ☐ LIS ☐

DENSITY: 800 BPI ☐ 1600 BPI ☐

SONIC CALIBRATION BY WST (WSC)

URGENT? YES ☐ NO ☒

IS A WELL SEISMIC EDIT (WSE) REQUESTED? YES ☐ NO ☐

(WSE IS RECOMMENDED WHERE FIELD STACK QUALITY IS AFFECTED BY BAD HOLE CONDITIONS)

REQUESTED TIME ORIGIN (SRD) 0 METRES ABOVE/BELOW MEAN SEA LEVEL (MSL)

STATIC CORRECTION TO BE APPLIED : –

______ MILLISECONDS FROM GROUND LEVEL **OR**

LAYER	VELOCITY	FROM	TO
1			
2			
3			

TRUE VERTICAL DEPTH (TVD) CORRECTION? YES ☐ NO ☒ (TVD IS RECOMMENDED IF DEVIATION EXCEEDS 5°)

DEVIATION DATA SUPPLIED? YES ☐ NO ☒

11 INCH WSC DISPLAY DEPTH SCALES TO BE USED (UP TO TWO) 1/5000 ☐ 1/1000 ☒ OTHER ☐

22INCH WIDE TIME/DEPTH DISPLAY SPECIAL TIME FUNCTION? (T – DEPTH/VELOCITY) YES ☐ NO ☐ VELOCITY ☐

22 INCH WIDE GEOLOGICAL INTERVAL VELOCITY DISPLAY? YES ☐ NO ☐ GEOLOGICAL MARKERS SUPPLIED ☐

SPECIAL SCALES TO BE USED? SPECIFY

GEOGRAM

URGENT? YES ☐ NO ☐

FREQUENCY TEST TO BE SUPPLIED BEFORE FINALIZATION (8 BAND WIDTHS) YES ☐ NO ☐

FINAL GEOGRAM PARAMETERS : –

(THE GEOGRAM INCLUDES DISPLAYS IN BOTH POLARITIES FOR EACH OF, PRIMARIES, PRIMARIES + MULTIPLES, PRIMARIES WITH TRANSMISSION LOSS, MULTIPLES ONLY FOR THE CHOSEN WAVELET AND T.V.F.)

WAVELET	FREQ.
KLAUDER ☒	12-60
MIN PHASE ☐	
ZERO PHASE ☐	
OTHER: ☐	

T.V.F.	T. LOW	T. HIGH	F. LOW	F. HIGH

SCALE IS 10 CM/SEC + ONE OTHER – SPECIFY ☐

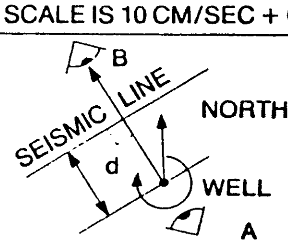
DIP OPTION YES ☐ NO ☐

SEISMIC LINE NUMBER ______

(ENCLOSE WELL LOCATION MAP VERSUS SEISMIC LINE)

DISTANCE BETWEEN TRACES ______

SECTION PERSPECTIVE: SEEN FROM A ☐ / FROM B ☐



d ______

∝ ______

∝ (CLOCKWISE)

SPECIAL REQUESTS: ______

VERTICAL SEISMIC PROFILE

URGENT? YES ☐ NO ☐

UP TO 3 VELOCITY FILTER TESTS WILL BE SENT PROVISIONALLY

SPECIFY NUMBER OF TRACES IN WINDOW REQUIRED 3 ☐ 5 ☐ 7 ☐ 9 ☐ 11 ☐

TIME VARIANT FILTER (TVF) TO BE APPLIED ON FINAL DISPLAY : –

TIME 1	TIME 2	FLOW	F. HIGH

SCALE IS 10 CM/SEC + ONE OTHER. SPECIFY ☐

SPECIAL REQUESTS?

ENCLOSE SEISMIC SECTION. INDICATE RELATION TO WELL ON A DIAGRAM

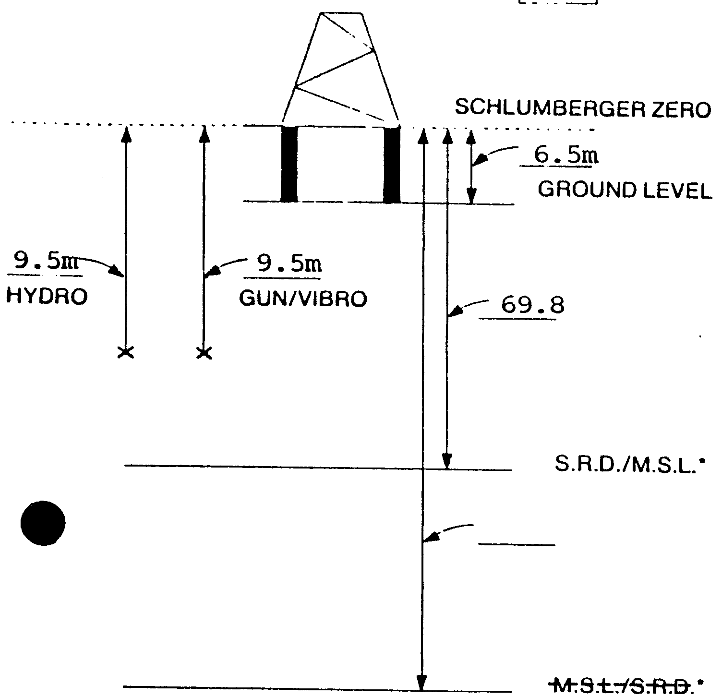
Distribution: White = Client; White = cumputing centre; Green = District; Pink = location

Schlumberger

GUN GEOMETRY SKETCH

CLIENT: BEACH PETROLEUM N.L. WELL: LINDON #1 DATE: 20 JAN 1984

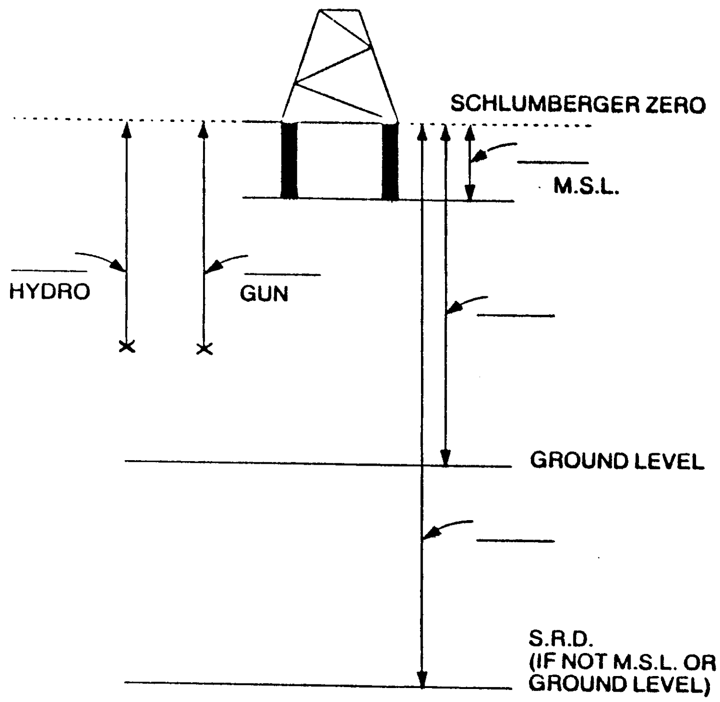
LAND [X]



INDICATE ALL DISTANCES RELATIVE TO SCHLUMBERGER ZERO

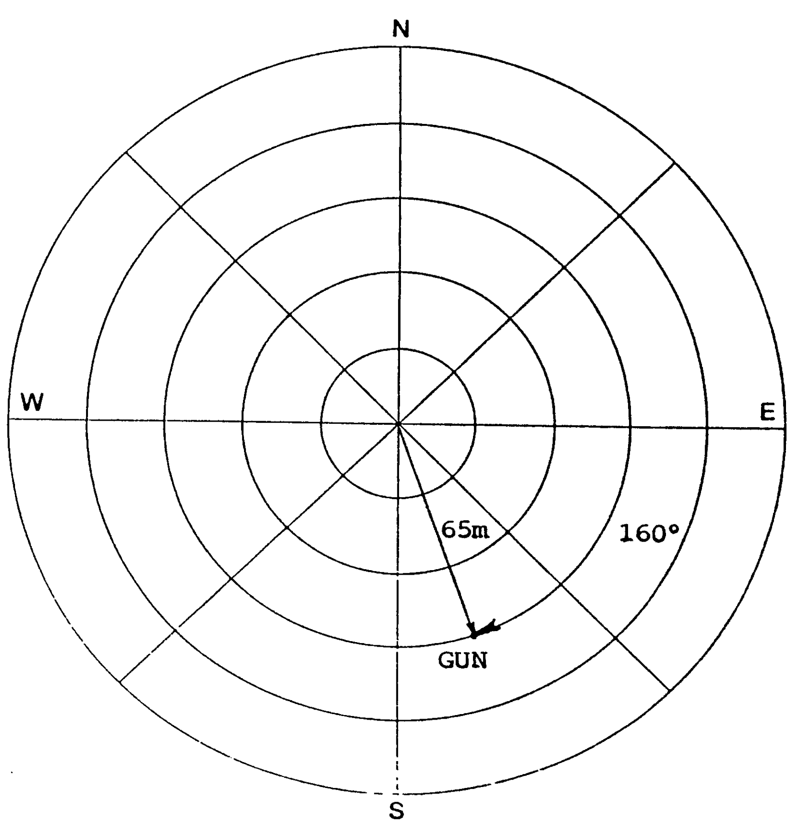
* DELETE AS APPLICABLE

OFFSHORE [ ]



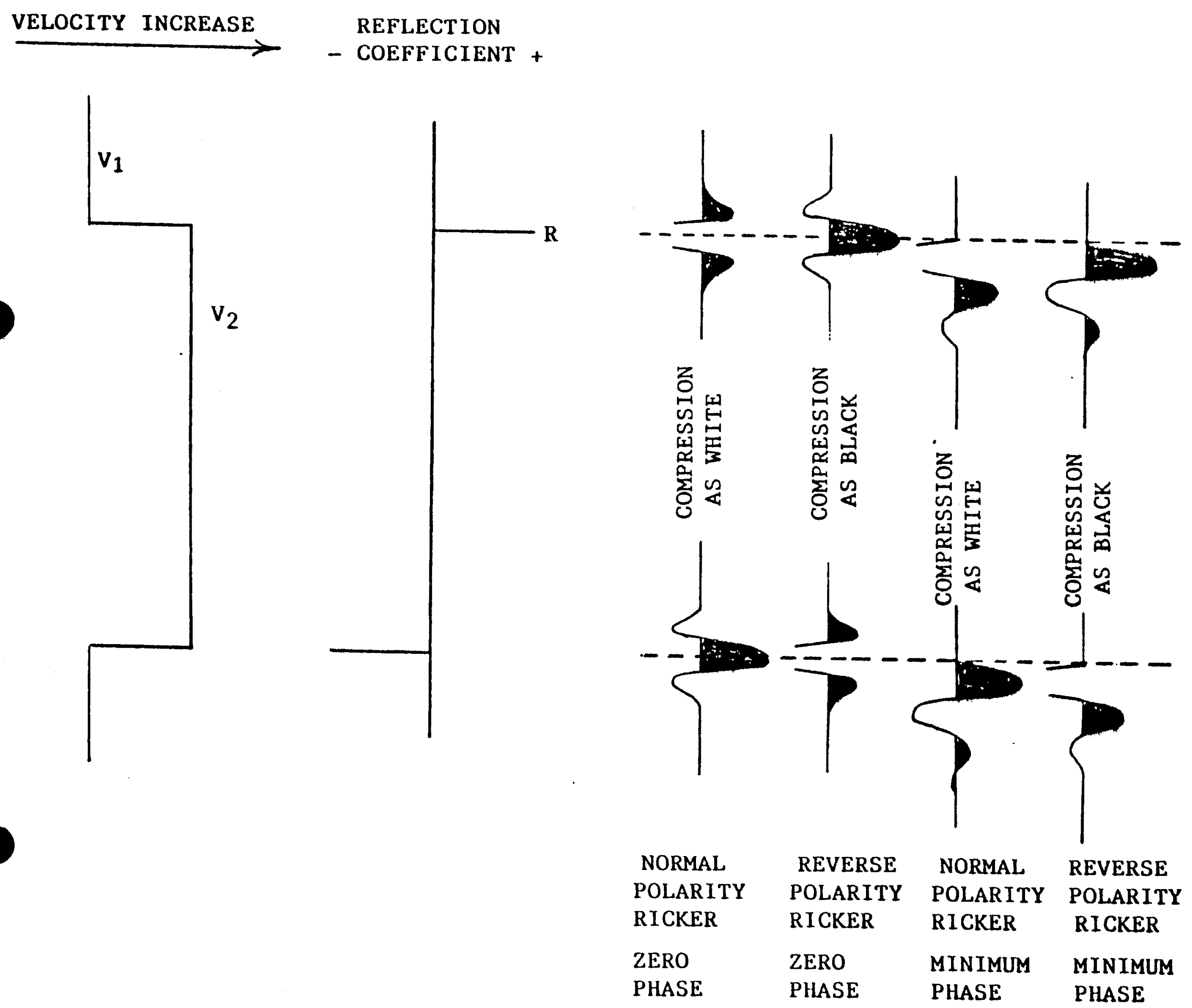
INDICATE ALL DISTANCES RELATIVE TO SCHLUMBERGER ZERO

SHOT POS'N	GUN OFFSET	HYDRO OFFSET	GUN DEPTH	HYDRO DEPTH
1	65m	65m	3m BGL	3m BGL
2				
3				
4				
5				
6				
7				



INDICATE GUN/VIBRO AND HYDROPHONE OFFSET AND AZIMUTH RELATIVE TO NORTH

SCHLUMBERGER WAVELET POLARITY CONVENTION



NOTE: WAVELET DISPLAYED UNDER GEOGRAMS ARE FOR A REFLECTION COEFFICIENT OF -O.

FIGURE 2

APPENDIX 15

LOG INTERPRETATION

WAARRE FORMATION - LOG EVALUATION

NO	Depth (m)	R_D	$Ø_N$	ρ_B	Ø Δt/CNL	Ø Δt	Ø FDC/CNL	R_W Ø/R	S_W Ø/R	F	R_{Wa} = Rt/F	R_W Overlay	$S_{W\%}$ Archie	$S_{W\%}$ Ratio
1	1228	3	38	2.3	38	32	32.9	0.33 Ω-m @ 124°F	80	7.0	.42	.36	90	70
2	1229	1.9	33	2.26	35.5	32	31		100	7.5	.25	.38	100	90
3	1230	1.7	36	2.2	39.7	35	34.2		95	6.1	.27	.39	100	95
4	1223	12	21	2.55	19.5	13	15.5		100	45	.26	.41	100	100

NOTE:-1. Compaction Factor was obtained by:-

i) FDC - Sonic Cross Plot Method = 1.3

ii) Neutron Method = 1

iii) Cp = Δt of adjacent shale / 100 = 1.07

Cp (average) = 1.1

2. Rw = slope of Sw = 100% line on Ø vs R crossplot

$= Ro = \frac{28}{85}$ (when Ø = 10%)

= 0.33 Ω-m @ Form. Temp.

3. Rmf = 0.31 N @ 80°F

BHT = 152° @ 1766m.

Waarre Formation Temp. = 124°F @ 1230m.

Rmf = 0.21 Ω-m @ 124°F.

CRAYFISH FORMATION

NO	Depth (m)	R_D	GR	I_{GR}	Δt	VSH(GR)	Ø	S_W
1	2967.5	35	85	0.21	66	0.11	0.11	0.34
2	2968.8	36	75	0.10	63	0.05	0.09	1.44
3	2970.4	31	75	0.10	66	0.05	0.12	1.15
4	2973.6	26	92	0.29	66	0.17	0.10	3.0
5	2983.4	22	68	0.02	76	0.01	0.23	0.22
6	2987.0	20.5	75	0.10	72.5	0.05	0.18	0.32
7	2989.6	20	90	0.27	69	0.15	0.14	0.46
8	2997.7	20	20	0.04	76	0.02	0.23	0.24

BHT = $244^{o}F$ @ 3011m.

Crayfish Formation Temp = $233^{o}F$ @ 2990m.

SP = +30 mV

Rmf = 0.10 R @ $76^{o}F$

= 0.034 Ω @ $233^{o}F$ Salinity = 70,000 ppm Cl^-

Rmf @ $75^{o}F$ > 0.1 Ω-m

Rmfeq = 0.85 Rmf

= 0.0289 Ω-m @ $233^{o}F$

Rweq = 0.075 Ω-m @ $233^{o}F$

Rw = 0.08 Ω-m @ $233^{o}F$

Salinity = 25,000 ppm Cl^-.

$$Cp = \frac{\Delta t \text{ adjacent shale}}{100}$$

$$= 0.73$$

Δtma = 53 psec/ft

$\Delta t_f - \Delta t_{ma} = 132$

$\Delta t_{sh} = 73$

$I_{gr} = GR_{log} - GR_{min} / GR_{max} - GR_{min}$

where $GR_{min} = 66$, $GR_{max} = 155$

$V_{sh(gr)} = 0.33 \ (2^{(2xIgr)} - 1.0)$

for older consolidated rock

$$\emptyset = \left(\frac{\Delta t_{log} - \Delta t_{ma}}{\Delta t_f - \Delta t_{ma}} \times \frac{100}{\Delta t_{sh}}\right) - V_{sh} \left(\frac{\Delta t_{sh} - \Delta t_{ma}}{\Delta t_f - \Delta t_{ma}}\right)$$

BEACH PETROLEUM

NO LIABILITY

(Incorporated in South Australia)

POSTAL ADDRESS:
P.O. BOX 360, CAMBERWELL, VICTORIA. 3124
TELEPHONE: (03) 813 3311
TELEGRAPHIC ADDRESS: 'BEACHPET'
TELEX: AA 36500 BEAPET

4TH FLOOR
685 BURKE ROAD
CAMBERWELL, VICTORIA. 3124
AUSTRALIA

26th June 1984

Mr Roger Williams
Schlumberger Seaco Inc.
PO Box 230
Sale Vic 3850

Dear Roger

Re: Global Interpretation on Lindon-1 (Otway Basin)

With the additional information acquired it is hoped that the current Global interpretation can be improved on..

Please find enclosed:-

1. A thin-section petrological report - 23 December 1982.
2. A petrological report - 12 April 1982.
3. An Rw
4. A mineralogical study of the clay fraction
5. Core description

I would make the following observations as contributions to the discussion of an ammended Global interpretation:-

1. Petrographic work indicates a bimodal sand size population that does not extend into the silt size range. Can we include the model's silt size range in the quartz sand size range - at least within the Pebble Point Formation (910-950 m K.B.). This may allow other mineral types known to exist to be included in the model.

2. Siderite has been identified as a significant component while limonite has not. Mineral 2 may be better assigned as siderite over a longer interval to include all of the Pebble Point Formation. Presently mineral 2 only covers interval 950-935 m.

3. The effect of siderite would, due to its density of approx. 3.83 - 3.88, reduce apparent porosity and also suggest a higher clay content using density readings.

.../2

BEACH PETROLEUM N.L.
LINDON #1
WILDCAT
AUSTRALIA

O.H.LOGS: The O.H. Logs used were FDC-CNL,BHC,DLL-MSFL, and GR. The shallow reading tools were affected by bad hole in several intervals and were not weighed as heavily as the rest of the logs. Lithological content was difficult to characterize due to the limited number of tools run. Adding to the difficulty of the analysis is the presence of two distinct clay types which could not be fully characterized with the limited number of measurements.

MODEL USED: The model used was one of SAND-SILT-LIMONITE-CLAY. The CLAY is composed of a mixture of Montmorillonite and Illite.

FLUID PARAMETERS: The RW used was 1.3 @ 57c. This RW value was derived from porisity and RT information. The SW parameters used were: A=.81, M=2 ,N=2.

J. House

4. The clay types present are dominantly kaolin, some smectite which increases with depth and some chlorite. This information comes from a study of the clay fraction using X-Ray Diffraction interpretation on core samples. (Depths of samples corrected to wireline log data):-

Sample 1	915.98 m
Sample 2	916.59 m
Sample 3	917.25 m

5. The effect of the K^+ deficient Kaolinite would increase apparent porosity due to the Neutron tool reading hydrogen ion content. What are the expected effects of smectite and chlorite.

6. The Rw was obtained by direct measurement of a DST recovered sample and corrected for drill mud contamination. This is lower than that used in the current Global interpretation.

7. Note occurrence of oil in the core description.

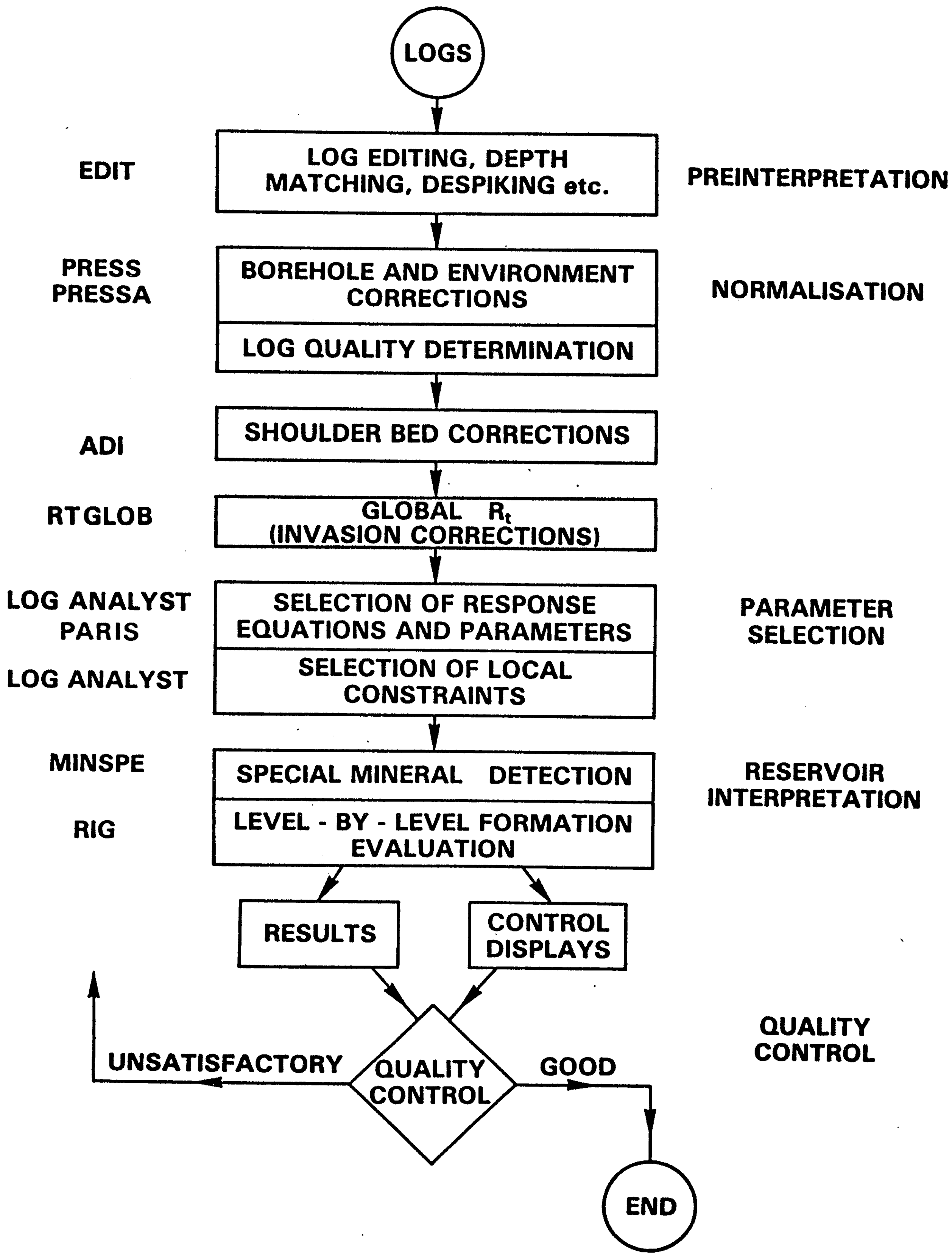
Hopefully, the additional data will provide the basis for a higher confidence interpretation. Please do not hesitate to advise if you require any other details.

Yours faithfully
BEACH PETROLEUM NO LIABILITY

S Guba
GEOLOGIST.

SC:cmn
Encl.

DESCRIPTION OF GLOBAL CPI CHAIN



BEACH PETROLEUM

RIG: RICHTER RIG 14 BIT RECORD WELL: LINDON 1 SPUD DATE: 1/12/83

Bit no.	Size	Make	Type	IADC Code	Serial number	Depth out	Feet MTRS	Hours	Cum. Hours	Av. ROP	WOB 1000 LBS	RPM	BHA	Dev	Jets	GPM	Press	MUD			Bit Cond			Remarks.
																		WT	vis	WL				
1RR	17-½	HTC	OSC-34J	1.1.1.	KT 468	348'	348'	6-3/4	6-3/4	51.6	5-10	120	Slick	3/4°	3x24	435	400	8.6	35	-	2	2	I	Surface casing point
2	12-½	HTC	J1	1.1.6.	BM 914	2789'	2441'	31-½	38-¼	77.5	35	120	Slick	1°	15.16.16	550	1650	8.8	40	13.4	7	4	1-1/16	Intermediate casing point
3	8-½	HTC	J1	1.1.6.	006 FS	2994'	205'	5-½	43-3/4	37.3	25-35	120	Slick	-	10.10.11	220	600	8.6	45	17.5	6	2	1	Pulled for DST# 1
CHI RR	8-15/32	CDP	C-18	-	31857F	3009'	15'	2-½	46-¼	6.0	7-11	90	-	-	-	240		8.6	45	12.4	10%	WORN		Barrel jammed 89% rec;
4	8-½	HTC	J3	1.3.6.	816 VK	3041	42'	½	46-3/4	84.0	11	50	Slick	-	3x9	220	1000	8.7	42	10.4	1	1	I	Pulled for DST# 2
RR4	8-½	HTC	J3	1.3.6.	816 VK	3937'	896'	17-¼	64	51.9	25-35	100/120	Slick	3-¼	3x9	264	1550	8.8	42	9.5	8	2	¼	Pulled due to slow penetration
5	8-½	HTC	J-22	5.1.7.	708 SS	5818'	1881'	39-¼	103-¼	47.9	25-35	65	Stab at 60'	2°	3x9	275	1700	9.5	41	8	1	1	I	Pulled for logging
6	8-½	HTC	J-22	5.1.7.	712-SS	2196m	423m	73-3/4	177	5.7	16	70/80	"	2-¼	9/9/11	275	"	9.7	39	8.5	1	4	I	Pulled - Slow R.O.P
7	8-½	"	J-11		430 VA	2430m	234	65-¼	242-¼	3.58	17	60/80	"	3°	"	275	"	"	42	9.5	B 2	7	1	Broken inserts Bearings locking
5RR	"	"	J-22		708-SS	2619m	189	70	312-¼	2.7	17	70	"	3-½	"	"	"	9.6	41	14	B 2	7	1-1/16	One broken insert Bearings done
8	"	"	"		774-SS	2830m	211	74	386-¼	2.85	17	70	"	3-3/4	"	"	"	"	40	11	B 1	7	1	Broken inserts Bearings done
9	"	"	"		773 SS	2954m	124	50	436-¼	2.48	15	70	"	4	"	"	"	"	42	9.4	1	8	I	1 Loose cone
10	"	SEC	M 44		334427	3011m	57	22-¼	58-½	2.56	15	70	"	3-¼	10/10/11	290	1600	"	41	10	2	2	I	Seals ruptured w/-
																								POH (otherwise Green)

NOTE: Indicate reason for pulling bit.

Additional comments:

Symbols for grading dull bits

RR/NR :Rerunnable / not rerunnable

BT/WT/LT :Broken / worn / loose or lost teeth

RG :Rounded gage

SF/SE/SQ :Seals failed / effective / questionable

N/M/H :Nose / middle / heel row

1/2/3 :Cone number

ENCLOSURES

1) Mud Log
2) Composite Log

PE601229

This is an enclosure indicator page.
The enclosure PE601229 is enclosed within the container PE902502 at this location in this document.

The enclosure PE601229 has the following characteristics:

ITEM_BARCODE = PE601229
CONTAINER_BARCODE = PE902502
NAME = Exlog Mud log
BASIN = OTWAY
PERMIT =
TYPE = WELL
SUBTYPE = MUD_LOG
DESCRIPTION = Exlog Mud log
REMARKS =
DATE_CREATED = 01/03/1984
DATE_RECEIVED = 26/10/1984
W_NO = W841
WELL_NAME = Lindon-1
CONTRACTOR = EXLOG
CLIENT_OP_CO = Beach Petroleum NL

(Inserted by DNRE - Vic Govt Mines Dept)

PE601230

This is an enclosure indicator page.
The enclosure PE601230 is enclosed within the container PE902502 at this location in this document.

The enclosure PE601230 has the following characteristics:

```
      ITEM_BARCODE = PE601230
 CONTAINER_BARCODE = PE902502
              NAME = Composite Well Log
             BASIN = OTWAY
            PERMIT =
              TYPE = WELL
           SUBTYPE = COMPOSITE_LOG
       DESCRIPTION = Composite Well Log
           REMARKS =
      DATE_CREATED = 02/01/1984
     DATE_RECEIVED = 26/10/1984
              W_NO = W841
         WELL_NAME = Lindon-1
        CONTRACTOR = Beach Petroleum NL
      CLIENT_OP_CO = Beach Petroleum NL
```

(Inserted by DNRE - Vic Govt Mines Dept)