FAHLEY NO. 1 WELL COMPLETION REPORT

BY: BEACH PETROLEUM N.L.
DR. A. TABASSI

DECEMBER 1985

TEXT

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FAHLEY-1
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BEACH PETROLEUM N.L.

(Incorporated in South Australia)

BEACH PETROLEUM N.L.

FAHLEY NO. 1 - PEP 105

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SUMMARY

Fahley No. 1 was drilled as a wildcat exploration well in the PEP 105, western Otway Basin, Victoria, approximately 65 km north-west of Portland.

Drilling commenced on the 28th April 1985 and reached a total depth of 3211 m (K.B.) on the 29th June 1985.

The primary objectives were encountered at the Pebble Point Formation and in the sands at the basal section of the Waarre Formation. DST Nos. 1 and 2 were designed to test the potential of the Pebble Point reservoir but the tests were misrun. The potential of the Waarre reservoir was not tested due to premature abandonment of the well. There were also a number of horizons, with minor oil fluorescence particularly within the Belfast Mudstone Member and Waarre Formation, which did not warrant any test.

Due to mechanical difficulties and/or high hole deviation the well was sidetracked twice in the basal section of the Paaratte Formation.

An attempt was to be made to log the bottom section of the well prior to abandonment but the drilling string became stuck in the hole and could not be removed. The final logging program was then reduced to a velocity survey in the casing only. Runs 1 and 2 of wireline logging had already covered the well to the depth of 2150 m.

Fahley No. 1 was plugged and abandoned as a dry hole on the 10th July 1985.

1. INTRODUCTION

The Fahley prospect was identified by interpretation of the OB84 Wanwin Gorae Seismic Survey and confirmed by the OB85 Wanwin Gorae Detail Seismic Survey.

The prospect was a seismically defined north-east plunging nose intersected by a down-to-basin, north-west - south-east trending Palpara Fault. The principle target horizons were the basal Tertiary Pebble Point Formation and the basal Upper Cretaceous Waarre Formation. The secondary targets were sands within the Tertiary Dilwyn Formation, the Pember Mudstone Member and the Upper Cretaceous Paaratte Formation.

Geologically the Fahley prospect is located on the north-western extension of the Portland Trough informally called the Kinkella Synclinorium. It is also located approximately 7 km south of Tartwaup Fault a major down to the south transcurrent fault. Hydrocarbon shows have been reported from a number of Government drilled wells within the Kinkella Synclinorium as well as in Beach/GFE Lindon No. 1 to the east.

Hydrocarbon was postulated to have migrated from the Eumeralla Formation into the major reservoir targets via a number of prominent down-to-basin faults including the Tartwaup Fault.

The nature of reservoir and seal rocks of the Tertiary section was largely based on Wanwin No. 3, drilled 15 km to the east by the Government in 1983. Caroline No. 1, drilled 14 km to the west by Alliance Oil Development in 1967(?) was considered as a guide for the deeper section of the well. Reference was also made to the number of Government waterbores in the area as well as Lindon No. 1, drilled 45 km to the east-south-east by Beach/GFE in 1983. The reference to the latter was made on general concepts of exploration only.

2. WELL HISTORY

2.1 Location (See Figure 1)

Co-ordinates:	Latitude 37° 57' 22.318" S Longitude 141° 02' 48.152" E
Geophysical Control:	Line WG 235, Shot Point 310 Line WGD 342, Shot Point 114 OB84A Wanwin Gorae Seismic Survey & OB85A Wanwin Gorae Detail Seismic Survey Beach Petroleum N.L.
Real Property Description:	Parish of Palpara Shire of Portland County of Follett
Property Owner:	R. & P. Riordan Pty. Ltd.

2.2 General Data (See Figure 2)

Well Name and Number:	Fahley No. 1
Tenement:	PEP 105
Operator:	Beach Petroleum N.L., 685 Burke Road, CAMBERWELL, VIC., 3124.
Participants:	Beach Petroleum N.L. 685 Burke Road, CAMBERWELL, VIC., 3124. Gas and Fuel Exploration N.L., 171 Flinders Street, MELBOURNE, VIC., 3000.

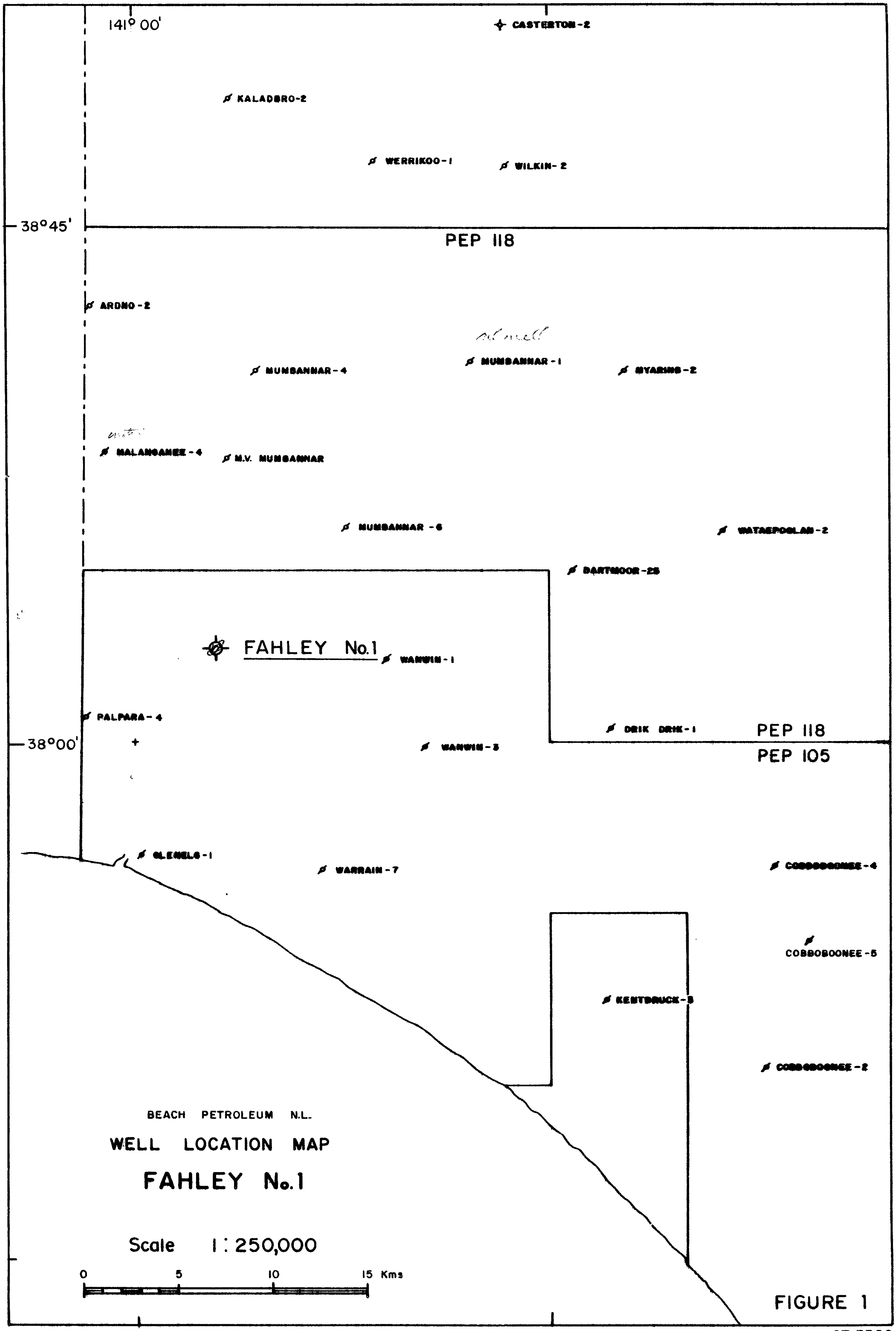

FIGURE 1

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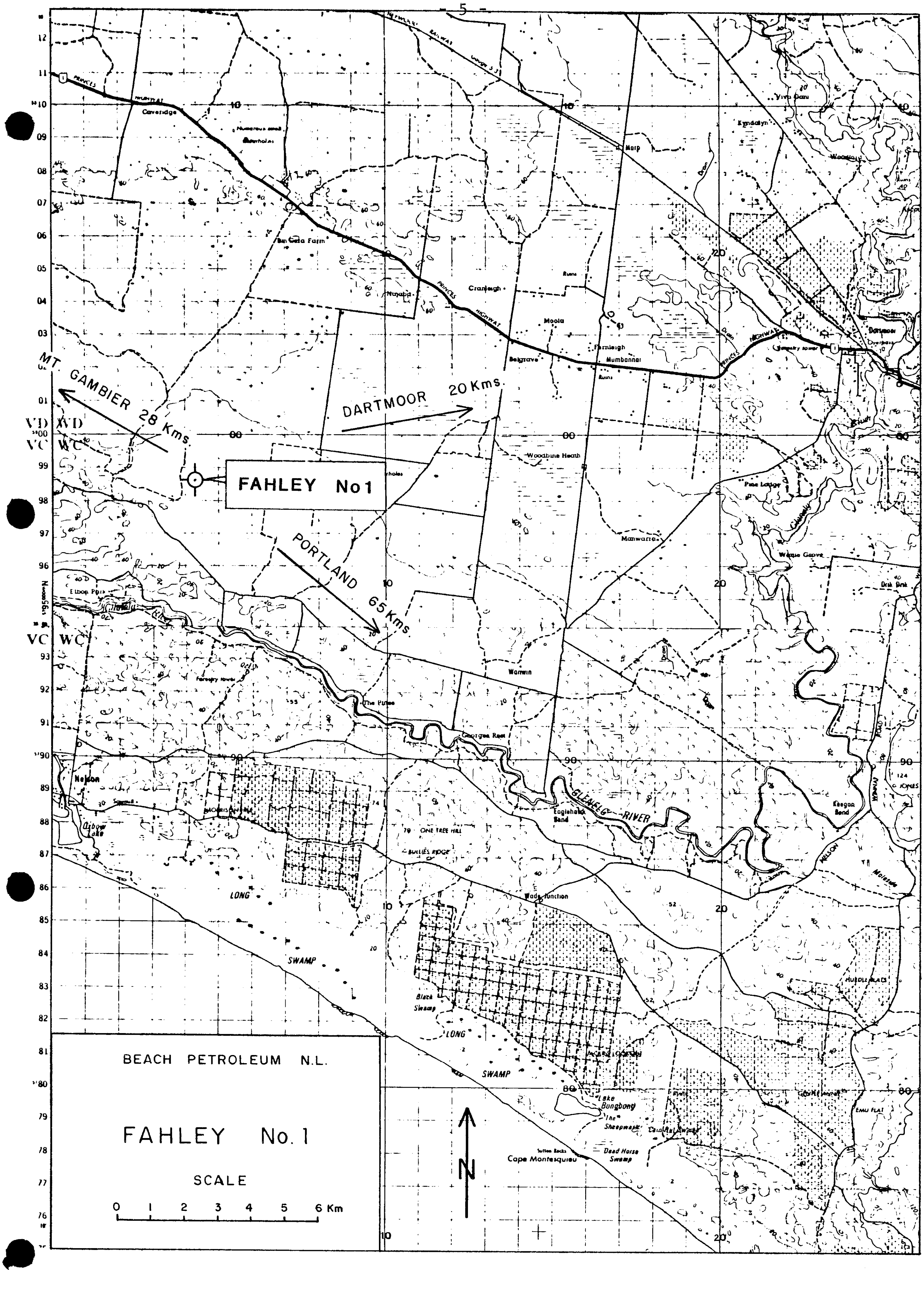

MT. GAMBIER 28 Kms.
DARTMOOR 20 Kms.
FAHLEY No1
PORTLAND 65 Kms.
PRINCES HIGHWAY
GLENELG RIVER
LONG SWAMP
Nelson
Caveridge
Cranleigh
Moola
Belgrave
Mumbannar
Woodbine Heath
Manwarra
Warrain
Georges Rest
The Pines
Eaglehawk Bend
Keegan Bend
ONE TREE HILL
Wade Junction
Black Swamp
Lake Bongbong
Cape Montesquieu
Dead Horse Swamp
Oxbow Lake
Elbon Park
Dartmoor
Kyndallyn
Vivo Dam
EMU FLAT
BEACH PETROLEUM N.L.
FAHLEY No.1
SCALE
0 1 2 3 4 5 6 Km
N

FIGURE 2

Elevation:	Ground Level 38.88 m Kelly Bushing 44.28 m (Unless otherwise stated, all depths refer to K.B.)
Total Depth:	Driller 3211.0 m
Date Drilling Commenced:	28th April 1985 @ 0900 hrs
Date Total Depth Reached:	29th June 1985 @ 2300 hrs
Date Rig Released:	10th July 1985 @ 1900 hrs
Drilling Time to Total Depth:	62 days
Status:	Plugged and abandoned.

2.3 Drilling Data (see also Appendix 1 & 2)

2.3.1 Drilling Contractor

Petroleum Drilling Services (Australia) Pty. Ltd.,
5 Westcombe Street,
DARRA, QLD., 4076.

2.3.2 Drilling Rig

P.D.S.A. Rig 2 Superior 700E

2.3.3 Casing Details

Conductor

A 20" conductor pipe was set @ 10 m K.B.

Surface Casing

Size:	$13^3/8$"
Weight:	48 lb/ft
Grade:	H-40
Connection:	ST & C
Centralizer:	One each at 85 m, 75 m, 67 m across stop rings.
Float Collar:	76.0 m
Shoe:	87.0 m
Cement:	160 sacks Class A Neat followed by 160 sacks Class A cement with 2% $Ca\ Cl_2$.
Cemented to:	Surface
Method:	Displacement
Equipment:	Halliburton skid mounted unit.

Intermediate Casing

Size:	$9^5/8$"
Weight:	36 lb/ft
Grade:	J-55
Connection:	BTC
Centralizer:	One each at 953 m, 941 m, 932 m across top rings.
Float Collar:	943.0 m
Shoe:	956.0 m
Cement:	56 sacks Class A with 4% Prehydrated Gel followed by 444 sacks Class A Neat.
Cemented to:	Surface
Method:	Displacement
Equipment:	Halliburton Skid Mounted Unit.

Cement Plugs

- Plug No. 1

Interval:	1179 - 1094 m
Cement:	440 sacks Class A Neat.
Method:	Balanced
Tested:	Tagged @ 984 m with 20,000 lb

- Plug No. 2

Interval:	984 - 876 m
Cement:	156 sacks Class A Neat
Method:	Balanced
Tested:	Tagged @ 876 m with 8,000 lb, pressure tested to 1100 psi.

- Plug No. 3

Interval:	Surface
Cement:	25 sacks Class A Neat
Method:	Hand mixed.
Tested:	No

2.3.4 Drilling Fluid (see Appendix 3 for details)

17½" Hole, 5.4 m to 88.7 m

The well was spudded using a lime - flocculated Gel spud mud system, with a viscosity of 35 seconds.

12¼" Hole, 88.7 m to 956.0 m

The 12½" hole section at the well was drilled using lime - flocculated mud as in the 17½" hole. This mud system was maintained by additions of prehydrated Gel, Caustic Soda and Lime.

Through the lower part of the 12¼" hole section, less prehydrated Gel was added and more use was made of the drilled native clays to provide viscosity.

8½" hole, 956.0 m to 3211.0 m

The 8½" hole section of the well was drilled using KCl - Polymer mud system:

- Original Hole

  The mud remained fairly constant throughout this section with the following properties maintained:

Mud Weight:	1.13 - 1.15 S.G.
Viscosity:	38 - 42 seconds
Filtrate:	6.4 - 7.6 ml
KCl Concentration:	7 - 9¼%

  On a trip at 1718 m, in the Paaratte Formation, tight hole occurred from 1685 m up to 1259 m with up to 40,000 lb overpull. On running back in, tight hole occurred from 1375 m, the string was temporarily stuck at 1480 m, reamed down to 1492 m, then became temporarily stuck again at 1513 m, after which continuous reaming was required back to bottom. A large amount of filter cake in the cutting returns suggested that the tight hole was the result of filter cake build-up on very permeable formation in an in-gauge hole. Due to high deviation, (12° at 2320 m), it was decided to plug back and sidetrack the hole.

. Sidetrack No. 1

While drilling out the cement plugs the KCl - Polymer mud became contaminated by cement, resulting in high pH and a reduction in yield point due to the effect of calcium ions in the polymers. Once the kick off had been accomplished, Bicarb. of Soda was then added, resulting in the pH gradually dropping and the yield point increased. This resulted in the mud viscosity increasing to 50 seconds.

Drilling of new hole progressed through the sand and shale sequence of the Paaratte Formation and the upper section of the Belfast Mudstone Member. At 2433 m following a mechanical problem with the rig, the pipe became stuck. A free point survey followed by back off operation freed the pipe and left the fish in the hole. It was then decided to set a cement plug and sidetrack again.

. Sidetrack No. 2

In the second sidetrack the kick off was established by using dyna drill. During the drilling of this section the mud properties remained relatively constant as follows:

Mud Weight:	10.1 ppg
KCl Concentration:	10 - 12%
Viscosity:	48 - 58 seconds
Filtrate:	5 - 8 ml

The mud weight was raised to the maximum of 11.5 ppg near T.D. in response to hole problems apparently associated with overpressuring.

2.3.5 Water Supply

Due to the high water table in this area, the entire water consumed during the course of drilling was obtained from a pit dug adjacent to the turkey nest.

2.4 Formation Sampling and Testing

2.4.1 Cuttings

Cuttings samples were collected at 10 metre intervals to 300 metres and at 5 metre intervals from 300 metres to T.D. Each sample was washed, oven dried, divided into four splits and stored in labelled polythene bags. Three complete sets were distributed as follows; one each for Beach Petroleum N.L., Gas and Fuel Exploration N.L. and the Victorian Government. One spare set was retained by Beach Petroleum.

In addition, from 300 metres to T.D. an unwashed 10 metre composite sample was collected, stored in a labelled calico bag and allowed to dry in the sun. This set of samples has been retained by Beach Petroleum for possible further analysis.

2.4.2 Cores

(a) No conventional coring operations were performed.

(b) No sidewall core sampling was attempted.

2.4.3 Tests

Two drill stem tests were attempted (see Appendix 4 for details)

Drill Stem Test No. 1

Interval Tested:	1284.12 - 1297.55 m
Formation Tested:	Pebble Point
Test Type:	On bottom open hole straddle test - misrun
Upper Packer Set At:	1284.12 m
Lower Packer Set At:	1297.55 m
Cusion:	No cushion
Preflow:	Upon opening the tool it is believed the upper packer seat failed.
Recovery:	Drilling fluid only.

Drill Stem Test No. 2

Interval Tested:	1280.46 - 1296.33 m
Formation Tested:	Pebble Point
Test Type:	On bottom open hole straddle test - misrun.
Upper Packer Set At:	1280.46 m
Lower Packer Set At:	1296.33 m
Cusion:	No cushion
Preflow:	Upon opening the tool it is believed the upper packer seat failed.
Recovery:	Drilling fluid only

2.5 Logging and Surveys (see Enclosures 2 & 3)

2.5.1 Mudlogging

A standard skid-mounted Exploration Logging mud logging unit was used to provide penetration rate, continuous mud gas monitoring, intermittent mud and cuttings gas analysis, pump rate and mud volume data. The Masterlog is included as Enclosure 2.

2.5.2 Wireline Logging

Wireline logging was performed by Schlumberger Seaco Inc. using a Cyber Service Unit. Two runs were performed and details are listed below. A provisional processing of the "Global Interpretation" which was carried out over the interval 1176 - 1474 m is included as Appendix 5.

Run 1

Dual Laterolog (DLL-SP-GR-Cal)	87.0 - 952.5 m (GR to surface)
Sonic Log (LSS-GR)	87.0 - 952.5 m

Run 2

Dual Laterolog (DLL-MSFL-SP-GR-Cal)	955.0 - 2143.5 m
Sonic Log (LSS-GR)	955.0 - 2143.0 m
Litho-density/)	955.0 - 1010.0 m
Compensated)	1170.0 - 1220.0 m
Neutron)	1290.0 - 1365.0 m
(LDL-CNL-GR-Cal))	1930.0 - 2050.0 m

These logs are included as Enclosure 3.

2.5.3 Deviation Surveys

A Totco double recorder was used to measure hole deviation, the results of which are listed below:

Depth(m)	Deviation(°)	Depth(m)	Deviation(°)
36	3/4	1725	1 3/4
64	1	1781	2
89	1	1975	2
278	½	2029	2½
372	1¼	2079	2
570	3/4	2087	3¼
677	2½	2106	3
857	2½	2116	4
956	3½	2125	3 3/4
1047	3	2144	2 3/4
1214	8¼	2176	2
1229	6	2224	2
1247	6	2281	2¼
1271	6	2347	1½
1287	5½	2423	1 3/4
1295	5¼	2509	1 3/4
1336	4	2702	1¼
1394	3	2918	2½
1479	2½	3036	3
1545	3	3198	2

2.5.4 Sidetracking

Due to mechanical problems the well was sidetracked twice in the basal section of the Paaratte Formation (see Appendix 6 for details).

2.5.5 Velocity Survey

A velocity survey was carried out by Schlumberger Seaco Inc., the results of which are included as Enclosure 3.

3. RESULTS OF DRILLING

3.1 Stratigraphy

The following stratigraphic intervals have been delineated using penetration rate, cutting analysis and wireline log interpretation. The latter was used to the depth of 2143.0 metres only (see also Figures 3 and 4). (All depths are in metres.)

Group	Formation	Member	Depth (K.B.)	Depth (Sub-sea)	Thickness
Heytesbury			Surface	+38.9	198.0
Nirranda			198.0	-153.7	93.5
Wangerrip	Dilwyn		291.5	-247.2	721.5
		Pember	1013.0	-968.7	274.0
	Pebble Point		1287.0	-1242.7	36.0
Sherbrook	Paaratte		1323.0	-1278.7	1055.0
		Belfast	2378.0	-2333.7	499.0
	Waarre		2877.0	-2832.7)	334.0
		Basal Waarre	3113.0	-3068.7)	
T.D.			3211.0	-3166.7	

The Belfast Mudstone Member and Waarre Formation tops are below the depth which is covered by wireline log. Therefore these tops were picked on the basis of gross lithology, sand/shale ratio and general comparison with the Caroline No. 1 well. Caroline No. 1 is the only well in this area, on the downthrown side of the Tartwaup Fault, which penetrated the entire section of the Upper Cretaceous Sherbrook Group.

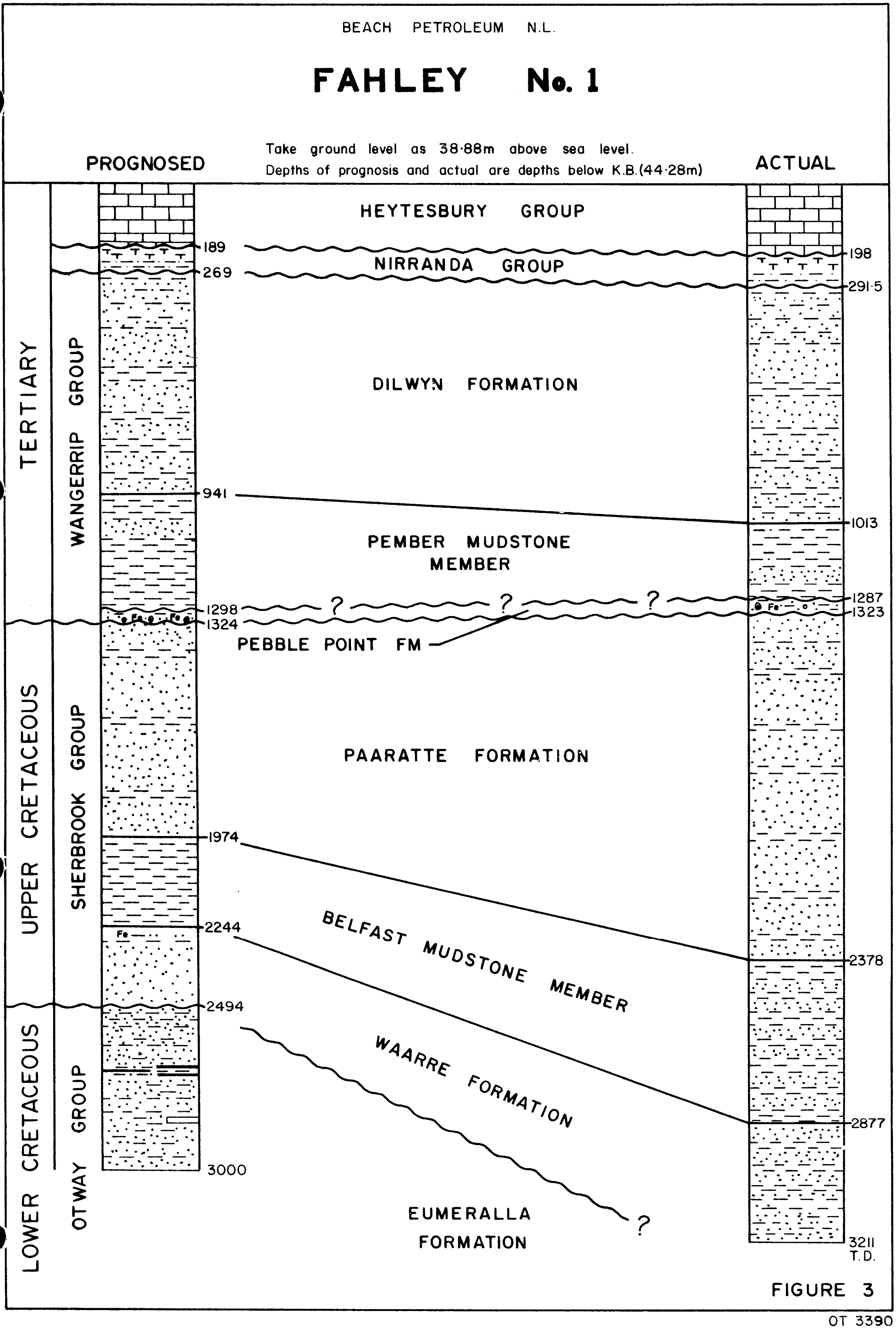

FIGURE 3

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BEACH PETROLEUM N.L.

OTWAY BASIN STRATIGRAPHIC TABLE

GENERAL TIME SCALE Period	Age	GROUP	FORMATION	MEMBER	GENERAL LITHOLOGY	OIL/GAS
Q.		POST-HEYTESBURY	NEWER VOLCANIC, WHALERS BLUFF FM., ETC.		NEWER VOLCANIC	
TERTIARY	Pliocene	POST-HEYTESBURY	NEWER VOLCANIC, WHALERS BLUFF FM., ETC.			
	Miocene	HEYTESBURY	PORT CAMPBELL			
	Oligocene	HEYTESBURY	GELLIBRAND			
			CLIFTON		Fe	
	Eocene	NIRRANDA	NARRAWATURK			
			MEPUNGA		Fe	
		WANGERRIP	DILWYN	Burrungule	OLDER VOLCANIC	
	Palaeocene	WANGERRIP	DILWYN	Pember		
			? PEBBLE POINT	?	? Fe	LINDON-1
CRETACEOUS UPPER	Maastrichtian	SHERBROOK	PAARATTE	Timboon Sand		
	Companian			Undifferentiated part		
	Santonian			Skull Creek Mudstone and Nullawarre Greensand		
	Coniacian			Belfast		
	Turonian		FLAXMAN		L Fe	
	Cenomanian		WAARRE		Fe	North Paaratte, Wallaby Creek, Grumby
CRETACEOUS LOWER	Albian	OTWAY	EUMERALLA	Heathfield		Port Campbell No.4
	Aptian	OTWAY	?	?		
	Neocomian		CRAYFISH	Geltwood Beach; Pretty Hill	?	
JURASSIC	Late	? —	? CASTERTON	?	BASAL VOLCANIC	
	Middle					
PALAEOZOIC		BASEMENT				

.SE MAP OT.2068.

OT. 3188

FIGURE 4

The top of the Belfast Mudstone Member was picked at 2378.0 metres at the top of a relatively thick shale which is uninterupted by any major sand unit. Below this depth the sand/shale ratio is relatively lower than that of the overlying Paaratte Formation. Furthermore, the first appearance of the chlorite minerals in the 2400 m sample (see X-Ray Diffraction Analysis in Appendix 8) may be considered as a significant lithological change below 2378.0 metres, ie. top of the Belfast Mudstone Member.

The top of the Waarre Formation was chosen at 2877.0 metres below which depth the sand/shale ratio increases. However, although it is more in line with Caroline No. 1, this ratio is still significantly lower at Fahley No. 1 in comparison to those elsewhere in the basin. The sand/shale ratio increases still below the depth of 3113.0 metres. This interval (3113.0 m to T.D.) is tentatively called "Basal Waarre Sandstone" and exhibits minor lithological changes.

3.2 Lithological Descriptions

HEYTESBURY GROUP (Surface - 198.0 m)

Heytesbury Group (Undifferentiated)	Surface - 198.0 m CALCARENITE, white to light brown, orange, becoming white to light grey with depth, firm to hard, very fine to medium, dominantly

fine to medium, abundant bryozoans, echinoid spines and other shell fragments, trace loose, clear to milky to light brown, medium to very coarse, rounded quartz grains, trace chert, rare dolomite, ankerite and rare glauconite and carbonaceous detritus, fair visual porosity.

NIRRANDA GROUP (198.0 - 291.5 m)

Nirranda Group (Undifferentiated)	198.0 - 291.5 m CALCARENITE, white to light greyish brown, firm to hard, very fine, grading to CALCILUTITE in part, abundant shell fragments, trace forams, trace ankerite and chert, poor to fair visual porosity, interbedded with; SANDSTONE, light to medium orange brown, dark brown in part, loose to occasionally hard, fine to granular, dominantly very coarse, subrounded to rounded, poorly sorted iron - stained quartz with common calcarenite material, abundant dark brown clay matrix, strong iron oxide and calcite cement in part, trace iron oxide pellets, poor visual porosity.

WANGERRIP GROUP (291.5 - 1323.0 m)

Dilwyn Formation	291.5 - 1013.0 m From 291.5 to 450.0 m SANDSTONE, clear to very light

grey, loose to friable, hard in part, fine to very coarse, dominantly medium to coarse, angular to rounded, dominantly subangular to subrounded, poorly sorted quartz, trace to common light to medium greyish brown argillaceous matrix, trace silica and pyrite cement, trace carbonaceous detritus, rare mica, poor to fair visual porosity, interbedded with; CLAYSTONE, dark brown, very soft, very dispersive, sticky in part, trace carbonaceous detritus, slightly silty in part, rare pyrite.

From 450.0 to 1013.0 m
SANDSTONE, clear to very light grey, milky in part, very pale yellowish grey in part, loose, very fine to granular, pebble size in part, dominantly medium to coarse, subangular to well rounded, dominantly rounded, poor occasionally moderately sorted quartz, trace to occasionally abundant, light to medium greyish brown argillaceous matrix, dispersive in part, trace silica cement, rare to trace pyrite cement, trace carbonaceous detritus, trace mica, rare pyrite, rare quartz overgrowth, poor to good, dominantly fair visual porosity, interbedded with CLAYSTONE, medium to dark brown, light grey - brown towards

the base, soft, sticky, dispersive, massive in part, slightly to moderately carbonaceous, trace pyrite and micromica, rare fine to very coarse quartz sand grains, silty in part and grading to SILTSTONE, medium brown, light greyish brown towards base, firm, becoming soft with depth, massive in part, abundantly argillaceous, common carbonaceous detritus, trace mica, trace pyrite, trace very fine quartz sand grains in part, interlaminated with minor COAL, very dark grey to black, firm, earthy, subvitreous in part, blocky to platy, silty in part, argillaceous in part, rare pyrite.

Pember Mudstone Member

1013.0 - 1287.0 m
From 1013.0 to 1185.0 m
CLAYSTONE, medium brown to light greyish brown, becoming medium to dark greyish brown to dark olive - brown with depth, very soft, very dispersive, sticky, trace to common micromica, slightly carbonaceous, trace disseminated pyrite, rare very fine quartz sand grains, very slightly calcareous towards the base, grades in part to; SILTSTONE, medium brown to medium greyish brown, dark grey in part, very soft to soft, becoming firm towards the base, dispersive, sticky in part,

common to abundantly argillaceous, trace micromica and fine carbonaceous detritus, very fine quartz sand grains, trace pyrite.

From 1185.0 to 1215.0 m
SANDSTONE, light grey, friable, very fine to medium dominantly fine, subangular to subrounded moderately sorted quartz with rare pale yellow stained grains, trace argillaceous matrix, trace to rare silica cement, rare dolomite cement, common fine muscovite, trace pyrite, fair visual porosity, interbedded with minor Claystone.

From 1215.0 to 1287.0
CLAYSTONE, as per 1013.0 to 1185.0 m.

Pebble Point Formation

1287.0 - 1323.0 m
SANDSTONE, light to medium brown, becoming clear to medium grey with depth, friable to loose, very fine to very coarse, dominantly medium to coarse, subangular to subrounded, dominantly subangular, poorly sorted quartz, mostly iron-stained abundant medium to dark brown clay matrix (chamosite?), soft, dispersive, becoming light to medium grey with depth, trace silica and calcite cement with depth, trace coarse black lithics, trace carbonaceous detritus, nil

to very poor visual porosity, interbedded with; CLAYSTONE, light to medium grey, dark brownish grey in part, soft, subfissile to blocky, micromicaceous, occasionally carbonaceous, grades in part to; SILTSTONE, medium greyish brown to dark grey, soft to firm, massive to subfissile, common micromica, trace very fine quartz sand grains, trace pyrite, trace carbonaceous detritus, trace medium green lithics.

SHERBROOK GROUP (1323 - 3211.0+ m)

Paaratte Formation

1323.0 - 2378.0 m

From 1323.0 to 1451.0 m

SANDSTONE, clear to light grey, loose to friable, very fine to coarse, dominantly fine to medium, subangular to rounded, moderately well sorted quartz, trace medium grey argillaceous matrix, trace silica and pyrite cement, trace coarse muscovite, trace carbonaceous detritus and coally particles, trace lithics, rare fresh feldspar, fair to good visual porosity interbedded with; SILTY CLAYSTONE, medium grey to medium greyish brown, firm, very dispersive, subfissile, common mica, trace very fine to medium quartz sand grains, moderately carbonaceous, trace pyrite.

From 1451.0 - 2030.0 m

SANDSTONE, very light grey, light greyish brown, clear in part, loose to firm, hard in part, very fine to coarse, occasionally very coarse, dominantly fine to medium becoming dominantly fine with depth, sub-angular to rounded, rarely angular, dominantly subangular to subrounded, poor to fairly sorted quartz, trace to common white to medium grey, dark brown to black in part argillaceous matrix, kaolinite in part, very rare carbonaceous matrix in part, trace silica cement, rare pyrite cement, rare dolomite and/or ankerite cement, trace multi-coloured lithics, trace carbonaceous and coally detritus, trace to rare glauconite, rare partially altered feldspar, rare amber, poor to fair, occasionally good visual porosity, interbedded with CLAYSTONE, light to medium brownish grey, medium brown, medium to dark grey in part, very soft to soft, firm in part, sticky in part, dispersive, massive to subfissile, moderately silty in part, trace to common micromica, moderately carbonaceous in part, trace disseminated pyrite, moderately arenaceous in part, rare glauconite towards the base, grades in part to; SILTSTONE, light brownish grey to dark grey, dark to medium brown, medium to dark bluish grey in part, soft to firm, occasionally hard, common argillaceous matrix, massive, subfissile in part, trace to common carbonaceous flakes and detritus, trace to common micromica, trace very fine quartz sand grains, trace pyrite, trace multi-coloured lithics, trace to rare very fine glauconite towards the base, rare feldspar, interlaminated with minor COAL, very dark grey to black, hard brittle, blocky to platy fracture, earthy to subvitreous, minor pyrite laminae, with minor AMBER, medium orange brown hard, brittle, blocky to subconchoidal fracture.

From 2030.0 - 2378.0 m
SANDSTONE, clear to light grey, very light brownish grey in part, loose to friable, occasionally hard, very fine to coarse, dominantly very fine to fine, subangular to subrounded, poor to moderately sorted quartz, common light to medium grey argillaceous matrix, trace white kaolinite matrix, trace light brown silt matrix in part, trace occasionally common silica cement, quite strong in part, trace dolomite and/or

pyrite cement, trace multi-coloured lithics, trace carbonaceous detritus and coally particle, rare to trace glauconite, rare yellow stained quartz, rare pyrite, poor to fair visual porosity, interbedded with CLAYSTONE, medium to dark grey, very dark brownish grey in part, firm, very dispersive, subfissile, occasionally massive to subfissile, moderately carbonaceous and micromicaceous, moderately to very silty in part, trace fine, occasionally medium quartz sand grains, grades in part to sandstone as above, trace pyrite, very rare glauconite (?).

Belfast Mudstone Member

2378.0 - 2877.0 m

CLAYSTONE, medium to dark grey, medium to dark brown in part, firm, subfissile becoming fissile with depth, moderately dispersive in part, slightly to moderately carbonaceous in part, trace coally particles, trace medium brown cryptocrystalline dolomite, trace to rare micromica in part, rare pyrite, rare glauconite, rare partially altered feldspar in part, trace fine quartz grains in part, rare fine lithics, very silty in part, interbedded with;
SANDSTONE, off white to light grey, light to medium brownish grey in part, light grey to light

greyish green in part, friable to very hard, dominantly hard, very fine to coarse, dominantly fine to medium, angular to subrounded, dominantly subrounded, fairly sorted quartz, trace to common kaolin and occasionally light grey to medium brown argillaceous matrix, trace to common dolomite cement in part, trace strong silica cement in part, very rare pyrite cement, trace partially altered feldspar, trace to rare carbonaceous detritus and coally particles, trace multi-coloured lithics, trace yellow stained quartz sand grains, rare to trace medium brown, very hard, cryptocrystalline dolomite, very rare pyrite and glauconite, poor visual porosity.

Waarre Formation

2877.0 - 3211.0 m

From 2877.0 - 3113.0 m

CLAYSTONE, light to dark brownish grey, medium to dark grey, firm to hard, moderately dispersive in part, subfissile, occasionally subfissile - fissile, very silty in part, grades in part to SILTSTONE, common very fine quartz sand grains, common partially altered feldspar, trace to common carbonaceous flecks and laminae, trace micromica, non to moderately calcareous in part, trace slickenside in part, trace dolomite, calcite and ankerite crystals, rare pyrite and glauconite interbedded with SANDSTONE, very light grey, light brownish grey in part, firm to very hard, dominantly hard, very fine to fine, occasionally very fine to coarse, dominantly very fine, subangular, poorly sorted, occasionally moderately well sorted quartz, abundant kaolin clay matrix, strong silica cement in part, trace calcite and ankerite cement in part, rare pyrite cement in part, trace lithics, trace muscovite and biotite, trace carbonaceous flecks and laminae, very rare glauconite. Nil to very poor visual porosity, with minor COAL, black, hard, brittle, subconchoical fracture, subvitreous, trace pyrite.

From 3113.0 - 3211.0 m

SANDSTONE, off white to light brownish grey, hard to very hard, occasionally friable to firm at the top, very fine to fine occasionally very fine to coarse, dominantly very fine, subangular to subrounded, fairly sorted quartz, trace to common kaolin clay matrix, strong silica cement in part, strong calcite cement in part, rare dolomite and siderite cement in part, trace medium grey lithics, trace muscovite and black coally detritus, trace partially altered feldspar at the top, rare to trace quartz overgrowth, rare red heavy minerals, rare glauconite, very poor to poor visual porosity, with rare AMBER, medium brown, firm, brittle, with very bright yellow white fluorescence, giving moderately fast streaming moderately bright milky white cut fluorescence. The Sandstone is interbedded/interlaminated with CLAYSTONE as above.

3.3 Hydrocarbons

3.3.1 Mud Gas Readings

No significant background gas was noted until a basal section of Dilwyn Formation was penetrated at 966.0 m. From this depth a background gas of nil to 200 ppm C1 with a trace of C2 in places was present to the depth of 1287.0 m. At this depth the Pebble Point Formation was penetrated with a relatively high gas reading of 35 units at its top with the following breakdown (see Mudlog, Enclosure 2):

C1	2070 ppm	46.29%
C2	275 ppm	6.15%
C3	705 ppm	15.76%
iC4	450 ppm	10.06%
nC4	500 ppm	11.18%
2C5	250 ppm	5.59%
nC5	200 ppm	4.92%

The above gas readings were associated with a maximum Petroleum Vapours of 12 units.

The abrupt decrease of gas to the maximum of 5 units occurred at 1297.0 m where C1 through C5 were still present. The top of the Paaratte Formatin was penetrated at 1323.0 m, at which point gas levels dropped to approximately 2 units, with only C1 to C4 present. At 1355.0 m the gas levels dropped further to 80 ppm C1, 40 ppm C4 and 20 ppm C3 with no traces of C2. The C4 and C3 were gradually reduced to nil at 1435.0 m and 1470.0 m respectively. The lack of C2 gas at 1355.0 m and its relative low abundance at the top of the Pebble Point Formation is the phenomen which cannot (at least for the time being) be explained. However the gas chromatograph was checked systematically and calibrated by pre-analysed gas a number of times during the course of drilling.

From 1470.0 m to 1982.0 m the gas levels were steady between 20 to 70 ppm C1 with traces of C2 in places. The presence of minor coal seams in this interval did not significantly contribute to the background gas.

Between 1982.0 m to 3113.0 m, ie. basal section of the Paaratte Formation, the entire Belfast Mudstone Member and the upper section of Waarre Formation, the background gas levels increased slightly again with the maximum of 250 ppm C1 which generally ranged between 50 to 200 ppm. C2 and C3 ranged between trace to 50 ppm and nil to 25 ppm in this interval respectively. This fluctuation is believed to be the result of the lithological variation and change in porosity.

From 3113.0 m to 3211.0 m (T.D.) the background gas levels picked up again with C1 ranging from 100 ppm to 1100 ppm, C2 from 20 ppm to 200 ppm. C3 from nil to 40 ppm and traces of C4 in places. In the interval 3186.0 - 3189.0 m the gas levels rose to a maximum for the well of approximately 40 to 60 units (variable) total gas with the following breakdown (see Muglog in Enclosure for details):

C1	11080 ppm	93.82%
C2	580 ppm	4.91%
C3	100 ppm	0.85%
iC4	25 ppm	0.21%
nC4	25 ppm	0.21%

It should be noted here that the apparent over-pressuring in this zone could have contributed to the quantity of this gas kick.

Possible connection gas peaks were noted below 3183 m with the mud weight of 10.1 ppg. The pumps were shut down for 5 minutes and the gas resulting from this was 5 units above background, indicating the formation was becoming overpressured. Although the mud weight was continuously increased (up to 11.5 ppg), connection gas was present to the total depth. This together with the tight hole, experienced more frequently in this section of the hole, could be indicative of an increased formation pressure of unknown magnitude. (See Mudlog Enclosure 2 and Drilling Fluid Recap in Appendix 3 for details.)

3.3.2 Sample Fluorescence

In the shallow section of the well, oil fluorescence was observed in a two metre sand section in the Pember Mudstone Member only. The sandstone between 1274.0 to 1276.0 m had 20% very dull patchy medium yellow fluorescence giving a very weak pale yellow crush cut.

In the deeper section of the well from 2470.0 to 2862.0 m some sand units within the Belfast Mudstone Member had trace to 40% very dull even to patchy pale to medium yellow natural fluorescence giving a very weak dull milky white, becoming pale yellow to milky white with depth, crush cut fluorescence on a dry sample. The carbonaceous material exhibited similar cut whilst the coally material gave a very weak slow streaming milky white cut fluorescence.

From 3113.0 m to T.D. the basal Waarre Formation sandstones had trace to 10% pinpoint to patchy moderately bright, very pale yellowish white natural fluorescence giving a weak very slow streaming milky white cut fluorescence. The background total gas rose to a maximum of 4½ units with 805 pm C1, 400 ppm C2, 10 ppm C3 and 3 ppm iC4.

Oil staining and odour was not associated with these zones of fluorescence, nor any other portion of the well. No free oil was seen in the drilling mud at any time while drilling the well.

4. GEOLOGY

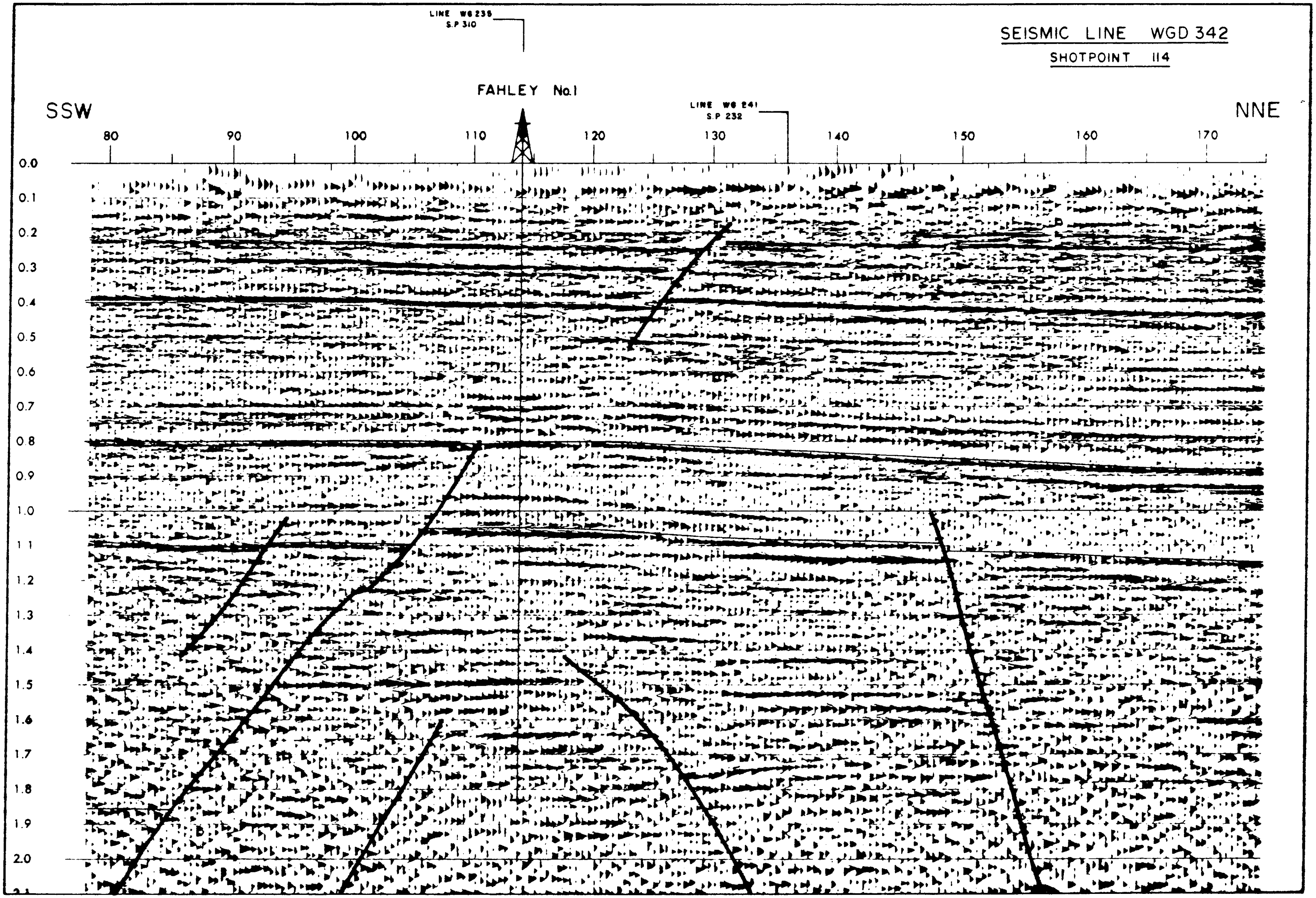
4.1 Fahley Structure

The Fahley structure was delineated after interpretating by the WG84 Wanwin Gorae Seismic Survey and subsequently refined by the WGD85 Wanwin Gorae Detail Seismic Survey.

Fahley No. 1 was designed as a test of the basal Tertiary Pebble Point Formation and the basal Upper Cretaceous Waarre Formation. The structure is a north-east plunging nose intersected by the down-to-basin, north-west - south-east trending Palpara Fault with closure developed from the Lower Cretaceous Otway Group through to the Middle Tertiary. However at "Near Top Belfast" level (which was previously thought to be "Top Waarre Formatin") the Fahley structure is now seen as a horst block combined with the above mentioned north-east trending nose. Closure at both the Pebble Point Formation and the "Near Top Belfast" levels are dependent on faulting with the critical closure to the south-east and north-west respectively.

It now appears that due to a lack of nearby well control and poor seismic quality at this depth (see Figure 5), the Waarre Formation cannot be confidently mapped with the available data. Further more, in the final stages of drilling the well, hole difficulties prevented drilling into the Lower Cretaceous Eumeralla Formation of Otway Group as well as wireline logging of the bottom section of the hole. As a result at this time no Waarre Formation reflector(s) at this well location has been resolved.

The basal Tertiary Pebble Point structure has an area of closure of 1.2 km^2 with a maximum vertical relief of 40 m (see Figure 6).



SEISMIC LINE WGD 342
SHOTPOINT 114
LINE WG 235
S.P 310
FAHLEY No.1
LINE WG 241
S.P 232
SSW
NNE
80
90
100
110
120
130
140
150
160
170
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2.0

FIGURE 5

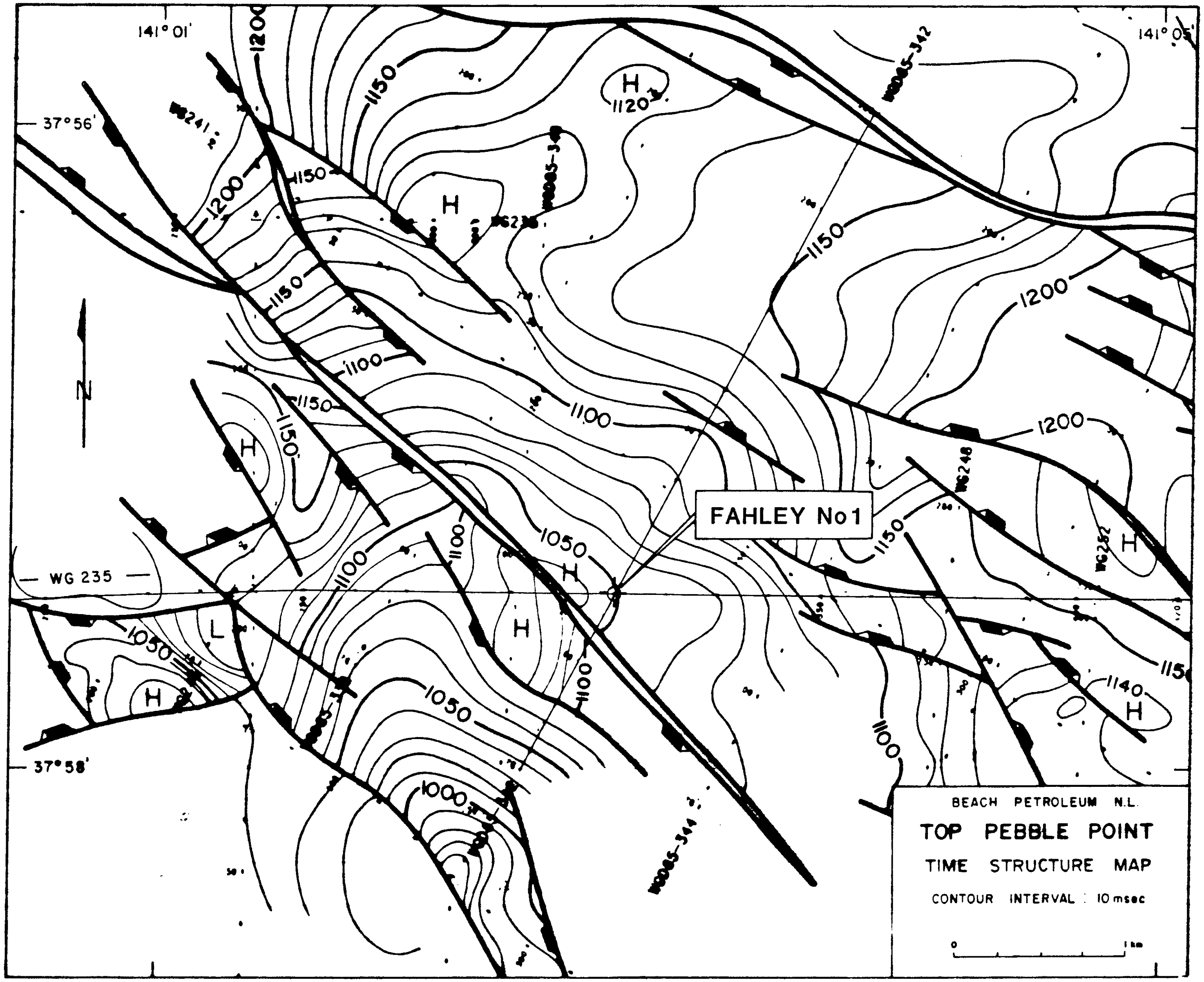

BEACH PETROLEUM N.L.
TOP PEBBLE POINT
TIME STRUCTURE MAP
CONTOUR INTERVAL : 10 msec
FAHLEY No 1
141° 01'
141° 05'
37° 56'
37° 58'
WG 235
N
H
L
1200
1150
1100
1050
1000
1120
1140

FIGURE 6

4.2 Maturation and Source Rock Analysis

Vitrinite reflectance estimates (Rv maximum) and total organic carbon analysis (T.O.C.) were carried out on seventeen cutting samples. Also thirteen cutting samples were analysed by the Rock Eval pyrolysis technique. Results of these two analyses are in Appendices 7 and 9.

As can be seen from Figure 7, the Rv maximum of the Pember Mudstone Member samples range between 0.28% and 0.32%. This suggests the basal section of the basal Teritary Wangerrip Group at Fahley No. 1 is immature and could not be expected to have generated any hydrocarbons at this depth. However, its total organic carbon content and kerogen type suggest that this section could have a fair - good oil and gas generating capacity at depths exceeding 2000 m.

The Rv maximum trend in the Upper Cretaceous Undifferentiated Paaratte Formation and Belfast Mudstone Member appears to have been interrupted by a relatively major fault. The available data suggests that the fault is located somewhere between 2030.0 m and 2300.0 m (basal section of the Undifferentiated Paaratte Formation) and has a throw in order of 200 m. The approximate location of the fault coincides with the depth where maximum deviation was recorded in the well prior to sidetracking (see Section 2.5.4 for detail).

On the downthrown side of the fault the sediments appear to be immature with Rv maximum ranging between 0.35% to 0.40%. This together with its relatively low T.O.C. value (ranging between 0.44% to 1.46%, average 0.86%) and kerogen type would rank this section as a poor gas-prone source rock.

On the upthrown side of the fault the sediments are marginally mature with Rv maximum between 0.58% and 0.66%. The total organic carbon content is higher than that of the downthrown side averaging 1.06%. This higher T.O.C. value is expected as five out of six samples from the upthrown side of the fault are from the Belfast Mudstone Member. The latter is known to have more carbonaceous material than that of overlying sediments.

Available vitrinite reflectance data also suggests that there is a fault somewhere between 2780.0 m and 2930.0 m. The apparent location of this fault is possibly between 2785.0 and 2795.0 m, (basal section of the Belfast Mudstone Member, where common slickensides and internally stressed quartz grains associated with common ankerite, dolomite and other carbonates etc. (see Mudlog, Enclosure 2 for details) were observed. The presence of this fault has apparently caused the Waarre Formation to become marginally mature to mature. Rv maximum ranges between 0.71% and 0.75% with the average T.O.C. of 1%. However, with inertinite as the dominant maceral with generally vitrinite and exinite being sparse, the claystone with the Waarre Formation at Fahley No. 1 is considered to be a poor gas-prone source rock.

In summary the basal Tertiary Claystone has a fair to good potential for generating hydrocarbons but it is not buried deep enough to be mature. The sediments in the Upper Cretaceous Sherbrook Group have very little to no potential of generating liquid hydrocarbons but have a fair chance of gas generations if they are mature. This clearly indicates that the oil generating source rock could only lie within the underlying Eumeralla Formation of the Lower Cretaceous Otway Group. The presence of "green fluorescing oil droplets" and the high production indices (PI > 0.3) could only be attributed to the presence of migrated

FAHLEY No.1

VITRINITE REFLECTANCE AND TOTAL ORGANIC CARBON PROFILE

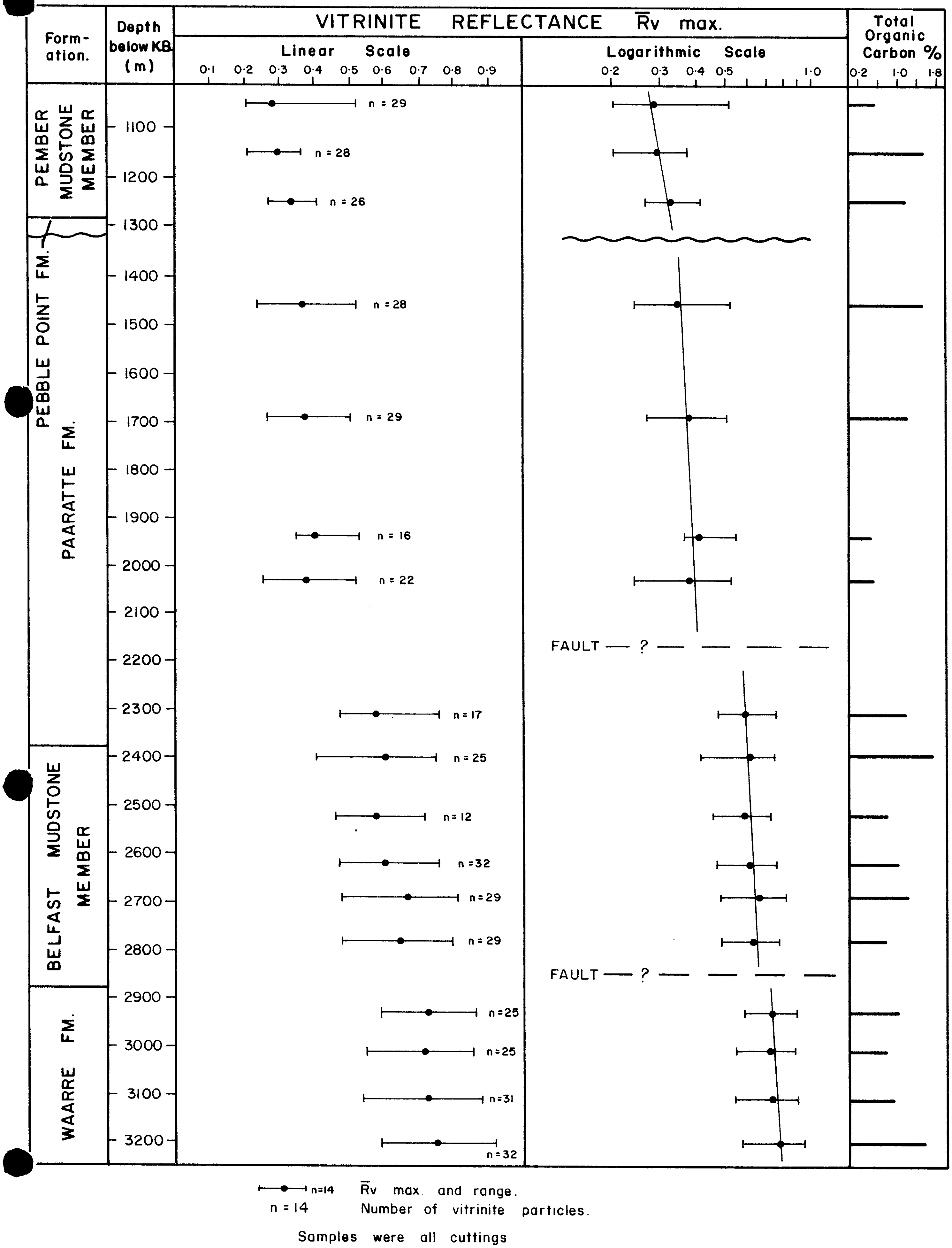


FIGURE 7

OT 3391

hydrocarbons (see Appendices 7 and 9 for details). However the consistent presence of the oil fluorescence from the depth 3113.0 m to T.D. could be due to the minor in-situ generation of oil as this section of the well is within the zone of onset of generation of hydrocarbons.

By extrapolation, the vitrinite reflectance value of 1% would be reached at the depth of approximately 4100 m.

4.3 Relevance to Occurrence of Hydrocarbons

Fahley No. 1 was plugged and abandoned as a dry hole. The primary targets of the basal Tertiary Pebble Point Formation and the basal Upper Cretaceous Waarre Formation appeared to be tight although hydrocarbon indications were noted in both targets.

A provisional log processing using the GLOBAL evaluation technique over the interval 1474 - 1176 m (see Appendix 5 for details) has indicated that the volume of the clay in the Pebble Point Formation increases dramatically from 50% at the base to approximately 98% at the top. During the drilling of the basal Tertiary it was attempted to test the gas show at the top of the Pebble Point Formation but the packer seat failed twice. As a result it was decided to test this zone with the inflatable packet seat at T.D. However this did not eventuate as the well was prematurely abandoned due to mechanical difficulties.

However because no wireline logs were run at the bottom section of the well (see Appendix 2 for details) no data other than mudlog and cutting descriptions are available to evaluate the Waarre Formation target in more detail.

Listed below are some considerations for future hydrocarbon exploration in the area:

1. The sandstone in the Pember Mudstone Member (1185 - 1215m) appears to be a good seismic marker at the Fahley Prospect and was penetrated at the prognosed depth. With 20% to 25% porosity and the maximum clay content of approximately 20%, the Pember sand appears to be a highly prospective reservoir.

2. The Pebble Point Formation also appears to be a good seismic marker which can be confidently mapped across the entire area. Using the velocity survey (run previously by Beach/GFE) in the Government drilled Wanwin No. 3 stratigraphy well, the top of the Pebble Point Formation was penetrated close to the prognosed depth. This suggests that there is no major lateral velocity variation between Wanwin No. 3 and Fahley No. 1.

3. Although it was previously thought that the Pember Mudstone adequately seals the Pebble Point Formation reservoir, results of the drilling however have thrown some doubt on this. The "Pember" sand on the downthrown side of the fault may be juxtaposed to the Pebble Point Formation on the upthrown side of the fault. If this is correct then the structure has been opened up to the south - south-west by faulting.

4. The lateritic lithologies which are usually associated with the Pebble Point Formation are also present at Fahley No. 1. As a result the reservoir quality of this horizon has been substantially downgraded. The Pebble Point Formation can therefore be considered as:

(a) a marginal reservoir only, or

(b) a seal for the underlying Timboon Sandstone.

5. The Timboon Sand Member of the Upper Cretaceous Paaratte Formation appears to be highly prospective at the Fahley No. 1 location. With porosity of up to 27% and clay content of less than 20% together with its proximity to the basal Tertiary Pebble Point Formation (to where migration and/or accumulation of hydrocarbons have already been proved in other wells) the Timboon Sand Member can be classed as a potential reservoir in this area. The hydrocarbon entrapment potential of this sand member will be upgraded if the entire overlying Pebble Point Formation is lateratised and act as a seal only.

6. Due to a lack of wireline logs below the depth of 2143 m the depth of the top of the Belfast Mudstone and Waarre Formation in Fahley No. 1 will remain questionable. The Caroline No. 1 well, was used for general comparison. Direct correlation did not seem to be appropriate as the two wells are a considerable distance from each other and located apparently in two different environment of depositions.

   Detailed petrological (including clay mineral identification by X-RD) and palynological studies were carried out in Fahley No. 1 (See Appendices 9 and 10 for details). Although very useful in a general sense, the results did not specifically resolve the problem.

   The present Belfast Mudstone Member and Waarre Formation tops are essentially based on the mudlog, cutting descriptions and in part the results of the abovementioned studies.

7. The Belfast Mudstone Member at Fahley No. 1 consists of interbedded claystone, sandstone and siltstone in part. The visual porosity of some of the sandstone units are fair to good and sealed by overlying claystone. This together with the presence of migrated hydrocarbons in these sandstones as suggested by the pyrolysis report, is indicative of a section which has potential.

8. The Waarre Sandstone appears to have, in part, undergone advanced diagenesis, causing significant reduction in primary porosity. In the absence of conventional and/or sidewall cores in Fahley No. 1, together with a lack of wireline log in this section of the well, examination of cutting samples was the only way to analyse reservoir potential of this formation. The binocular microscopy on the cuttings revealed very little on the genetic and diagenetic aspects of the formation but the transmitted light microscopy was, to some extent, successful.

   As shown by petrological studies (Appendix 8), the early diagenesis in Waarre Sandstone had commenced by deposition of clay on the quartz surfaces. This was then followed by the production of abundant kaolinite and quartz overgrowths. The former constitutes the large portion of the present matrix of the sandstone. The quartz overgrowths are readily recognisable under the transmitted light microscope with the early diagenetic clay rim separating the crystal from the overgrowth (see Figure 6 in Appendix 8).

   The secondary porosity, which is believed to follow the diagenesis, was not documented by the current studies. This is due to the fact that the majority of the sand grains of a porous sandstone disintegrate by the bit action and in the cutting samples it is impossible to distinguish these sands from cavings. However, the presence of some porosity, possibly of a secondary nature, can not be ruled out, as the formation does exhibit reservoir potential in some degree. The reservoir potential of the Waarre Sandstone is believed to be substantially upgraded by its close proximity to the apparent source rock, i.e. Eumeralla Formation. This gives the reservoir a better chance of accumulating hydrocarbons without the need for long distance migration.

CORRECTION AUTHORISED BY A. TABASSI PER L. DAVEY (G & F EX) J. Davies 21/3/86

9. The maturation profile obtained from Fahley No. 1 suggests that there is NO mature oil generative source rock penetrated. As a result it is believed that hydrocarbons present in different horzions in Fahley No. 1 (as was indicated by source rock studies, pyrolysis analysis and oil fluorescence observed in the cuttings) must have migrated from elsewhere. The exception is the basal sands of Waarre Formation where sediments are just mature and could have locally generated minor quantities of liquid hydrocarbons and expelled these to the adjacent sands. Hence the presence of consistent oil fluorescence for the last 198 m of the well.

10. Some overpressuring was observed during the drilling of the section of the hole below the depth of 3183 metres. The nature and magnitude of this phenomenon is not clear. Three alternatives seem possible.

(a) high pressure/low volume gas is present in the recrystallized sandstones of the Waarre Sandstone,

(b) overpressuring brought about by tectonically initiated directional stresses existing at the present time, and

(c) chemically initiated fracturing caused by different cations in the mud and the fracturing formation.

All three alternatives were checked in detail with the more likely alternative being (b). The pressure of faults through the section as well as the shape of cutting seen provide limited support.

APPENDIX 1

DETAILS OF THE DRILLING PLANT

DETAILS OF DRILLING PLANT

(a) RIG AND EQUIPMENT

Contractor's Rig No.	P.D.S.A. Rig 2
Drawworks:	Superior 700E
Compound:	S.C.R.
Engines:	4 Cat. 3412 PCTA
Rotary Table:	Oilwell 20½"
Substructure:	Dreco designed one piece, height 14', width 13'6".
Rig Lighting:	Explosion proof, flood and fluorescent fittings.
Mast:	Dreco model No. M12713-510, Height 127', Base Width 13'6" Gross Nominal Capacity 510,000 lbs
Crown Block:	1-36" Fast Line Sheave 5-36" Crown Sheaves.
Travelling Block:	Crosby McKissick 250 Ton Block WE Wilson 250 ton Hydro-hook
Swivel:	Oilwell PC300
Mud Pumps:	2 Gardner Denver PZ-8-750.
Mixing Pump:	5-50 HP 6" x 5" Mission Magnum
Mud Agitator:	6 - Pioneer 40 TD. 15 HP Pitbull.
Mud Tanks:	1-300 bbls. 1-360 bbls. 1-141 bbls.
Shale Shakers:	1 Brandt Dual Tandem
Desander:	1 Pioneer T8-6 Sandmaster
Desilter:	1 Pioneer T12-4 Siltmaster
Degasser:	1 Drilco Atmospheric
Generators:	S.C.R.
BOP's & Accumulator:	Annular Hydril GK 13 5/8" 3,000 PSI Ram type Hydril double 13 5/8" 5,000 PSI.
Kelly Cock:	Griffith
Drill Pipe Safety Valve:	Griffith
Air Compressors & Receivers:	2-LE ROI Model 660A, 2-120 Gallon receiver
Spools:	Refer inventory
Rathole Driller:	Yes

(a) RIG AND EQUIPMENT (CONT'D.)

Choke Manifold:	McEvoy 5,000 PSI, 2 chokes, SWACO Hydraulic 10,000 PSI super choke.
Drill Pipe:	10,000' - 4½" Grade E
Drill Collars:	30 - 6½", 6 - 8"
Shock Subs:	Refer inventory.
Kelly:	4¼" Square Kelly, 42' long.
Stabilizers:	Nil
Fishing Tools:	Refer inventory.
Handling Tools:	Refer inventory.
Instruments & Indicators:	Geosource 2 Pen Mud Sentry
Drilling Rate Recorder:	Geosource 6 Pen Recorder
Deviation Instrument:	Totco 0-8 degrees
Tool House:	Yes
Dog House:	Yes
Generator House:	Yes
Welding Equipment:	Yes
Pipe Racks:	Yes
Catwalks:	Yes
Water Tank:	Yes 1 - 400 bbls
Fuel Tank:	Yes 1 - 600 gals
Substitutes:	See inventory
Mud Testing:	Baroid
Junk Box:	Yes
Rathole Driller:	Yes
Mud Saver:	Yes
Cellar Pump:	Yes
Matting:	Yes
Pipe Straightener:	No
Hydraulic Pump:	Yes
Water Pumps:	Yes
Fire Extinguishers:	Yes

(b) TRANSPORT EQUIPMENT AND MOTOR VEHICLES

1 Heavy Duty Forklift

1 Toyota Pick Up Truck

1 Toyota 10 Man Troop Carrier

(c) CAMP AND EQUIPMENT

Fully Airconditioned Toolpusher/Company Rep Shack complete with cooking, refrigeration and ablution facilities independently powered by a Lister 25 KVA 50 Hz Generator Set.

APPENDIX 2

SUMMARY OF DRILLING OPERATIONS

SUMMARY OF DRILLING OPERATIONS

The Fahley No. 1 drilling site was prepared by the earthmoving contractor B. A. Price.

Prior to the rig arriving a 20" conductor pipe had been installed to 10.0 m K.B.

The P.D.S.A. Rig 2 was rigged up and Fahley No. 1 was spudded at 0900 hrs on the 28th April 1985.

A 17½" hole was drilled to 89 m and 13 3/8" casing was run and cemented.

The BOP's were installed and tested to 1000 psi.

Drilling resumed with 12¼" hole to 97 m and a leak-off test established a formation integrity of 14.4 p.p.g.

The 12¼" hole was continued to 957 m at which point the Schlumberger Dual Laterolog and Sonic Logs were run prior to running and cementing 9 5/8" casing.

The BOP functions were tested to 1500 psi.

Drilling resumed with 8½" hole to 960 m and a leak-off test established a formation integrity of 14.7 p.p.g. The 8½" hole was continued to 1305 m with a bit change at 1215 m.

DST No. 1 was misrun over the interval 1284.0 m to 1297.0 m.

DST No. 2 was misrun over the interval 1280.5 to 1296.0 m.

The 8½" hole was then continued to 2156 m with bit changes at 1781 m, 2029 m, 2115 m, 2079 m, 2181 m, 2053 m and 2088 m. Mechanical problems necessitated the hole being plugged back and redrilled three times.

At 2156 m the following Schlumberger logs were run, Dual Laterolog, Microspherically Focused Log, Sonic, Lithodensity and Compensated Neutron Log.

The 8½" hole was continued to a total depth of 3211 m with bit changes at 2201 m, 2426 m, 2702 m, 2761 m, 2832 m, 2925 m, 3039 m and 3094 m.

Total depth was reached at 2300 hrs on the 29th June 1985.

At 3211 m mechanical problems forced a reduced logging program consisting of a well velocity survey prior to plugging and abandoning the hole.

Cement plugs were then set over the intervals 1179 m - 1094 m, 984 m - 876 m and at the surface.

The rig was released at 1900 hrs on the 10th July 1985.

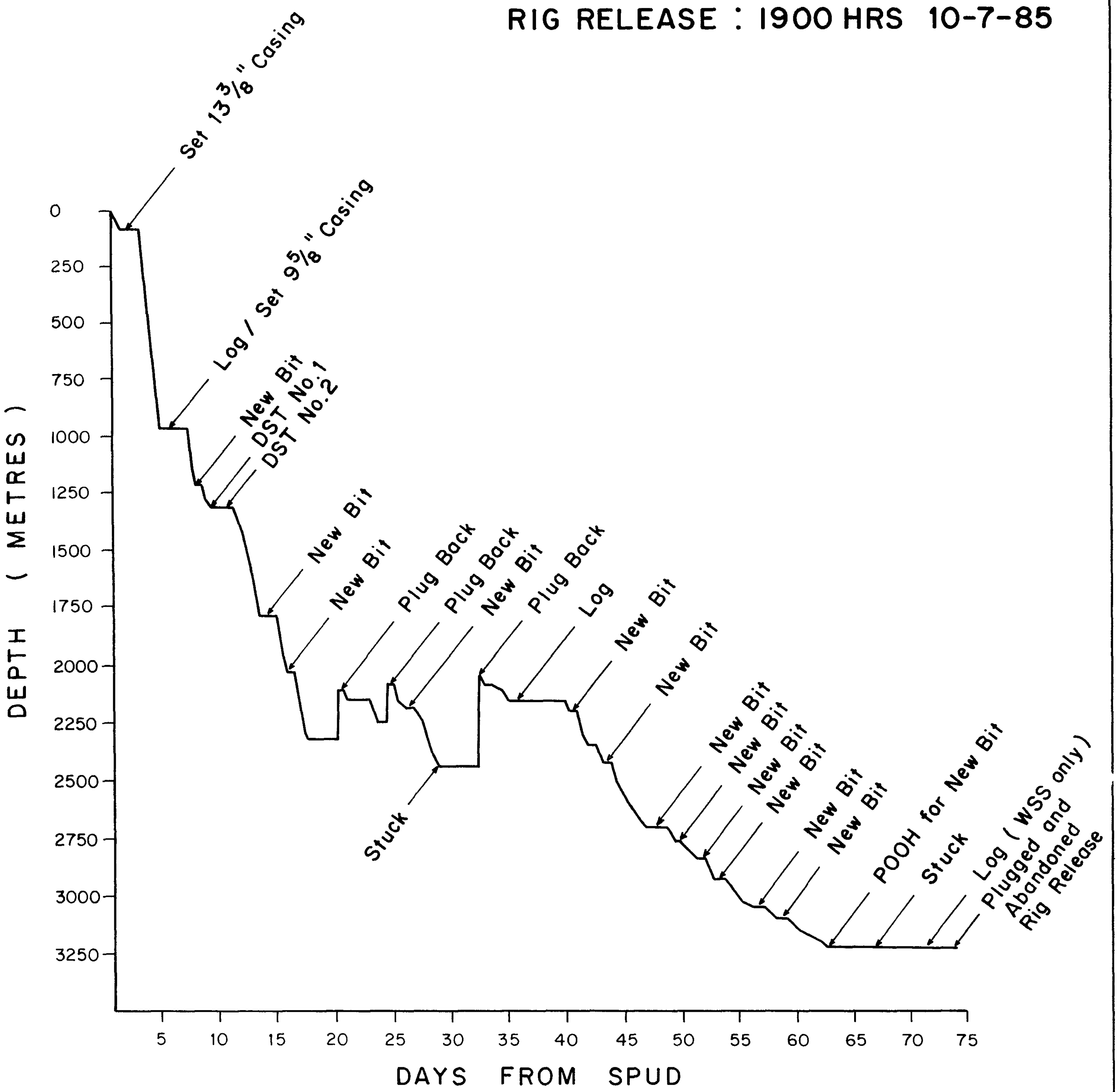
BEACH PETROLEUM N.L.

FAHLEY No. 1

SPUDDED : 0900 HRS 28-4-85

T.D. 3211 m : 2300 HRS 29-6-85

RIG RELEASE : 1900 HRS 10-7-85



ACTUAL PENETRATION PROFILE

APPENDIX 3

DRILLING FLUID RECAP

BEACH PETROLEUM N.L.
DRILLING FLUID RECAP
FAHLEY NO. 1

Prepared By : Manfred Olejniczak
Robert Glenn
Paul Hubbard

Dated : August 1985

TABLE OF CONTENTS

WELL SUMMARY

Operator	:	Beach Petroleum N.L.
Well Number	:	Fahley No. 1
Location	:	PEP-105, Victoria
Coordinates	:	Latitude : 37^{o} 57' 22.32" S
		Longitude : 141^{o} 02' 48.15" E
Contractor	:	P.D.S.A.
Rig	:	No. 2
Total Depth	:	3211 m
Elevation	:	RKB - GL 5.4 m RKB - SL 38.9 m
Arrived on Location	:	27 April 1985
Spud Date	:	28 April 1985
* Date Reached T.D.	:	29 June 1985
* Total Days Drilling	:	71
Date off Location	:	9 July 1985
Total Days on Well	:	73
* Total Cost of Mud Materials	:	$104,068.94
* Mud Costs/m	:	$32.41
* Mud Costs/day	:	$1,465.75
Engineer Service 72 days	:	No Charge
Total Cost Materials and Engineer Service	:	$104,068.94
Mud Materials not Charged to Drilling	:	-
Engineer Service not Charged to Drilling	:	-
Casing Program	:	20" @ 10 m
		$13^{3}/8$" @ 87 m
		$9^{5}/8$" @ 956 m

DISCUSSION BY INTERVAL

$17^{1}/2$" HOLE 5.4 m To 88.7 m (2 Days)

As the $17^{1}/2$" hole was to be spudded in with a Lime-flocculated Gel spud mud, prehydrated Gel was mixed in the reserve tanks during the final stages of rigging up.

During the drilling of the rat hole and mouse hole, the mouse hole collapsed and lost circulation occurred into the rat hole, requiring a slug of prehydrated Gel to restore circulation. This suggested the potential for lost circulation when drilling the surface hole.

The well was spudded in at 09:00 hours on the 28th April with the prehydrated gel added to water in the active mud tanks and flocculated with Caustic Soda and Lime. As drilling progressed, viscosity was maintained by further additions of prehydrated Gel, Caustic Soda and Lime while volume was maintained by constant water addition.

Drilled through the surface limestone at a variable drill rate with hard bands down to 1m/hr and soft sections up to 150m/hr. No massive mud losses occurred although there appeared to be occasional surface losses in the softer sections.

The flocculated mud gave quite adequate carrying capacity for the low density limestone, with a funnel viscosity of 35 and YP of 15 lb/100 ft^2.

Just prior to reaching casing point at 88.7 m, a Hi-Vis slug was pumped around and then the hole was circulated clean for $^{1}/2$ hour on reaching T.D. A wiper trip was run with no problems, followed by another Hi-Vis slug circulated around. On this occasion, partial returns were lost into the cellar as the Hi-Vis slug reached surface, however circulation was nearly completed.

The $13^{3}/8$" casing was then run and cemented to 87 m. During displacement only about 6 bbls of cement returned to surface, indicating that the hole was badly washed out.

DISCUSSION BY INTERVAL

12 1/4" HOLE 88.7m To 956 m 4 Days

After waiting on cement and testing the B.O.P. stack, drilled out the cement down to the float collar using the same Lime flocculated mud as in the 17 1/2" hole. Continued drilling with water from a reserve tank through the casing shoe to 96.6 m. The leak-off test was run with water, not mud.

After running the leak-off test, which gave a 14.4 ppg equivalent, resumed drilling with the old mud, retaining the cement contaminated water to further flocculate the mud.

While drilling ahead rapidly through mainly loose sands, the mud was maintained as a Lime-flocculated Gel System by additions of prehydrated Gel, Caustic Soda and Lime. The water loss was allowed to remain uncontrolled until nearing logging depth.

From about 450 m, mud losses occurred over the shakers due to sand blinding of the screens. Rather than attempt to constantly maintain them by brushing and washing, the bottom screens were removed. This allowed most of the finer sand through so that the desander and desilter had to be relied on to remove the bulk of this sand, which they did very effectively. This approach may not be that normally recommended, but during this very rapid drilling with low rig manpower, it was impossible to have people constantly cleaning shaker screens.

As drilled progressed, less prehydrated Gel was added and more use was made of the drilled native clays to provide viscosity. This resulted in an unattractive Lime-flocculated native clay mud which came in for some nasty comments from the loggers and drillers. However, this type of Lime-flocculated spud mud is very cheap and very effective at hole cleaning with mild inhibitive qualities, provided that no water loss control is desired.

Water loss control during this section was only begun prior to logging. When a casing shoe seat was being sought after 800 m, the system was deflocculated with Soda Ash and additional prehydrated Gel was added to maintain viscosity and provide water loss control.

After finding a desired clay thicker than 30 m for a casing seat, T.D. for this hole section was declared at 956 m.

DISCUSSION BY INTERVAL

$12^1/4$" HOLE (Cont'd)

While circulating out for 1 hour, 5 sacks of CMC-EHV were added to further improve water loss control, which was reduced to 13 ml for logging.

A trouble-free wiper trip was run to the shoe, with no fill encountered. Then circulated for another hour and pulled out to run logs.

Schlumberger logs were run without problems. The $9^5/8$" casing was run in and cemented to 955.9 m without running a wiper trip as the hole remained in good condition.

$8^1/2$" HOLE 956 m to 3211 m 65 Days

ORIGINAL HOLE

While nippling up and testing the B.O.P., the old Gel based mud from the $12^1/4$" hole was dumped, the tanks were washed and new KCl-Polymer mud was mixed.

The casing shoe was then drilled out with water down to 960 m for a leak-off test (14.7 ppg equivalent) by circulating through a reserve tank. Virtually no cement returns were observed at the shakers. However as soon as new KCl-Polymer mud was displaced into the hole after the leak-off test, a large slug of cement cuttings was carried out which immediately contaminated the new mud. In future, I would recommend drilling out the casing shoe with pre-flocculated old mud to clean the hole prior to displacing to new mud. If it was still desired to use water for the leak-off, the hole could be displaced to water and this could be dumped as new mud was displaced into the hole.

As drilling continued, the KCl-Polymer mud was maintained by additions of premixed mud from the reserve tanks with very little direct mixing into the active. In this way, mud properties remained very stable throughout the drilling of the original $8^1/2$" hole. Typical properties were as follows:

DISCUSSION BY INTERVAL

$8^1/2$" HOLE (Cont'd)

ORIGINAL HOLE (Cont'd)

Mud Weight	1.13 - 1.15 S.G.
Viscosity	38 - 42 seconds
Filtrate	6.4 - 7.6 ml
KCl Concentration	7 - $9^1/4$%

Due to rapid drilling through sands and soft clays, shaker screen blockage was a constant problem, so only one shaker could be run with a fine S80 mesh screen while the other used a B60. However, the good performance of the desander and desilter kept the solids content under control.

At 1215 m, while drilling the Pember Mudstone, the BHA had to be changed to reduce hole deviation which had reached 7°. This was to result in a small dogleg which caused problems later in the hole.

On drilling into the Pebble Point Sandstone target, two attempts were made to test a gas show at 1305 m, but both times the packer seat failed. It was decided to continue drilling, and evaluate the show from Schlumberger logs later.

Steady drilling resumed through the sands and clays of the Paaratte Formation. On a trip at 1781 m, tight hole occurred from 1685 m to 1259 m with up to 40,000 lb overpull. On running back in, tight hole occurred from 1375 m, became stuck at 1480 m, reamed down to 1492 m, then became stuck again at 1513 m, after which had to continuously ream through tight hole back to bottom. This took one days rig time. Returns at the shakers had a large percentage of filter cake, with very few actual cuttings, suggesting the tight hole was the result of filter cake buildup on very permeable formations in an in-gauge hole. A caliper log taken three weeks later showed this entire section to be very close to gauge at $8^1/2$" to 9". Also, during drilling, mud consumption appeared higher than anticipated, but this would be adequately explained by filtration losses.

The next trip at 2036 m still encountered tight hole on pulling out, but ran back in satisfactorily indicating the problem had been reduced.

BEACH PETROLEUM
FAHLEY NO. 1

DISCUSSION BY INTERVAL

$8^1/2$" HOLE (Cont'd)

ORIGINAL HOLE (Cont'd)

While drilling through sandier sections towards the bottom of the Paaratte Formation, a survey a 2303 m showed an 8^{o+} deviation, the maximum for the tool. Two further singles were drilled with low weight and high R.P.M. in an attempt to bring back the angle, but the next survey still showed 8^{o+}. While running this survey the pipe became stuck, probably differentially, and had to be worked free with 70,000 lb overpull with the kelly on. The pipe was tripped for a BHA change. On running back in, surveys were taken with a 16^o survey tool, showing an increase in deviation from 6^o at 2167 m to 12^o at 2320 m. It was then decided to plug back and sidetrack the hole, rather than attempt to reduce the deviation.

SIDETRACK NO. 1

A cement plug was set at 2220 m. While drilling the cement from 2113 m in an attempt to find hard cement to kick off, the rig damaged a draw-works bearing, just when it was thought a kick off was beginning. After pulling back to the shoe, it took nearly two days before the repair was completed. During this period the hole was taking 1 - 2 bbl/hr as apparent downhole filtration losses. This was confirmed when running back in to resume drilling cement, when a lot of filter cake was observed on the shakers. The remainder of the cement plug was soft and the kick off attempt failed, with the bit dropping through the bottom of the cement at 2220 m.

Another cement plug was pumped and later tagged at 2079 m. This plug was also soft, but by reaming down three times after each 5 ft of hole was drilled (in an attempt to wear the low side of the hole), a kick off was eventually achieved. Controlled drilling continued to 2131 m, when a new BHA was run in and normal drilling with light weight resumed. The bit weight was gradually increased as the hole angle decreased.

DISCUSSION BY INTERVAL

$8^1/2$" HOLE (Cont'd)

SIDETRACK NO. 1 (Cont'd)

During the drilling out of cement plugs and sidetracking, the KCl-Polymer mud was not treated chemically for cement contamination. The effects of contamination on this mud are minimal, resulting in a high pH and a reduction in yield point due to the effect of calcium ions on the polymers. It was felt that Bicarb. Soda treatment would be pointless while continuing to drill cement, as the source of the contamination would still be present and result in more calcium going into solution. Polymers would also be lost on the chemical precipitate. Once the kick off had been accomplished and cement returns had finished, Bicarb. Soda was then added, resulting in the pH gradually dropping and the yield point increasing as the effect of the calcium on the polymers was removed. This resulted in the mud viscosity increasing back to 50 seconds.

Drilling of new hole progressed for the next two days, past the original hole depth and into the top of the Belfast Formation from about 2381 m. The penetration rate slowed down to 3 m/hr in claystone sections.

After running a survey at 2414 m, erratic torque began after the pump strokes were reduced from 100 to 30 spm, with slight tight hole on a connection at 2426 m. The drawworks drive shaft coupling then broke while drilling at 2433 m. During the $1^1/2$ hrs it took to temporarily repair the coupling, the pipe could not be pulled off bottom or rotated. Although full circulation was maintained, the pipe became stuck. After jarring with the repaired coupling for several hours, a 20 bbl diesel-EZ SPOT pill was pumped downhole and allowed to soak for $5^1/4$ hours over the BHA while periodic jarring continued. No significant progress was made, so circulation and jarring were then resumed while waiting on a new drive coupling. As soon as the new coupling was installed, a Schlumberger free point survey was run through the kelly gooseneck. The pipe was then backed off at the indicated free point, one joint above the upjar in the heavy weight pipe. It was then decided to leave the fish (the entire string of collars, jars and some heavy weight pipe), set a cement plug and sidetrack again.

DISCUSSION BY INTERVAL

8 1/2" HOLE (Cont'd)

SIDETRACK NO. 1 (Cont'd)

The decision to sidetrack again was based on the assumption that the hole was packed off, as indicated by the erratic torque and tight hole immediately prior to the failure of the drive coupling. This however overlooked the possibility that the torque may have been due to either a worn bit or the drive coupling itself. As there was plenty of prior evidence of high filtration losses in the Paaratte, a high likelihood of differential sticking was possible, particularly as most of the collars were still in Paaratte sands and lag times indicated the holé also mostly in gauge. Full circulation had been maintained although there was a slight pressure increase. A packed off annulus would have restricted circulation more. After the initial diesel-EZ SPOT pill, no further consideration was given to treating the situation as possible differential sticking, despite suggestions to repeat the diesel-EZ SPOT together with a large slug of KCl Brine in the annulus to reduce the hydrostatic head significantly.

SIDETRACK NO. 2

After recovering the drill pipe, a cement plug was pumped on top of the fish. On pulling out, became temporarily stuck a couple of times for no apparent reason. The cement was then dressed down from 2053 m to 2088 m for a kick off. After circulating for 3/4hr, cement returns were still coming over the shakers. Then began pulling out, pulling tight from 1246 m, then becoming stuck for 2 1/2 hrs at 1190 m. Reamed back down from 1189 m to 1210 m with lots of cement returns on the shakers, suggesting a ledge loaded down with cement cuttings may have fallen in. Resumed pulling out but got stuck again at 1170 m and back reamed slowly for 10 m before the pipe finally came free. Then pulled out completely, picked up the jars, and ran back in on a check trip before running in with a dyna drill. Had to ream down from 1193 m to 1241 m over 2 hrs, then made a short 5 stand wiper trip to confirm this section was good before continuing to run in. Still had to ream from 1356 m to 1365 m and from 2070 m to 2088 m before the pipe was pulled out without problems.

DISCUSSION BY INTERVAL

$8^1/2$" HOLE (Cont'd)

SIDETRACK NO. 2 (Cont'd)

The dyna drill and bent sub assembly were then run in, washed 15 m to bottom and began drilling ahead slowly from 2088 m. The last three singles down to 2156 m were control drilled with the kick off believed to have been established. A wiper trip was run to the shoe with the dyna drill without problems, but while pulling out, had to work through tight hole at 1158 m for 1 hr. As it had been decided to run basic intermediate logs because of the persistant hole problems, ran back in with a bit for a wiper trip. Had to ream down from 1238 m to 1302 m over $5^1/2$ hrs and a bridge at 1925 m took $^1/4$ hour reaming before running to bottom. The pipe was then pulled out without problems, and Schlumberger logs were run.

The caliper log showed that the Pember Mudstone was washed out from 1150 m to 1300 m, with the section from 1250 to 1300 m being especially bad with a lot of off-scale readings and very prominent ledges. From 1300 m down, the hole was very close to gauge with only occasional minor washouts of one to two inches.

Throughout this period of intermittent stuck pipe and tight hole, cuttings over the shakers were small, hard and slightly elongated like cavings, but didn't resemble over-pressured cavings. There were no sticky clays, nor was there any significant solids increase in the mud. Also most of the hole was very free, but when the hole became tight, it was very tight. All these factors pointed to a mechanical form of tight hole rather than overpressure or hydrating, swelling formations. My original thought was that the casing shoe had fallen off, but this looked less likely as the stuck position varied. The other possibility was wedging or keyseating in prominent hard ledges, particularly as the section of tight hole tended to correspond to the section that had built up to 7^o earlier. I believe that the caliper log confirmed this idea, with very prominent ledges standing out through the Pember Mudstone. Just the fact that these ledges had survived so long indicated that they must have been very hard, and were possibly the cause of the original increase in deviation.

DISCUSSION BY INTERVAL

8 1/2" HOLE (Cont'd)

SIDETRACK NO. 2 (Cont'd)

The high degree of washout of the Pember Mudstone prompted requests to increase the KCl content of the mud, which was then 7 - 8%. It must be pointed out that the rest of the hole was in very good condition, implying that the KCl was inhibiting these formations sufficiently. Even while drilling the Pember Mudstone with KCl-Polymer, virtually no cuttings were observed on the shakers, as the mudstone simply collapsed under the jetting action of the bit, implying an inherent mechanical weakness in the formation.

The next four weeks tended to be a record of slow drilling, delayed even more by numerous instances of tight hole, stuck pipe and reaming till T.D. was finally decided upon. During this period the properties remained relatively consistent as follows:

Mud Weight	10.1 ppg
KCl Concentration	10 - 12%
Viscosity	48 - 58 secs
Filtrate	5 - 8 ml

The mud weight was raised near T.D. in response to hole problems.

After logging, began increasing the KCl content towards 10% with a corresponding rise in mud weight to around 10.1 ppg. On running back in, had to ream slowly back to bottom from 1325 m, with possible rubble broken from the ledges hanging up around the BHA. While still reaming at 1640 m, had to pull out for a washout and became stuck at 1180 m but worked free. After finally reaming back to bottom, drilling then continued through new formation, pumping Hi-Vis slugs at 2181 m and 2195 m to clear the hole of any remaining rubble.

DISCUSSION BY INTERVAL

$8^1/2$" HOLE (Cont'd)

SIDETRACK NO. 2 (Cont'd)

On a trip at 2201 m, had tight hole at 1167 m, but ran in without any problems and drilling then continued slowly through the sandstones of the Lower Paaratte Formation. In anticipation of drilling into the Belfast Shales, the KCl content was gradually raised towards 12% and the mud viscosity was also raised to 50 - 55 seconds to improve carrying capacity. The next trip at 2378 m was tight while pulling out from 2378 - 2103 m and again from 1175 m to 1146 m. While running back in, reamed from 1146 m to 1175 m in an attempt to knock off any protruding ledges before continuing drilling. The pipe became stuck on a survey at 2512 m, but came free after 10 mins jarring, suggesting slight differential sticking. While running a short wiper trip at 2521 m after drilling another single, had to pump out of the hole from 2477 to 2456 m, but ran back in without problems. This happened again on a short trip at 2607 m with tight hole from 2591 m to 2282 m, but again ran back in quite easily. The next wiper trip at 2668 m was trouble-free. During this period of tight hole around 2400 m, had a lot of filter cake returns on the shakers once circulation was resumed, indicating the problem of tight hole was due to filter cake buildup in very close to gauge hole, with a tendency towards differential sticking.

The hole was again tight while tripping at 2703 m and the pipe had to be pumped out from 1368 m to 1331 m and again from 1195 m to 1191 m back up in the Pember Mudstone. While running back in, had to ream from 1285 m to 1316 m. After continuing slow drilling, the next trip at 2760 m was troublefree, but a trip at 2832 m had to be reamed back in from 1357 m to 1362 m. Drilling continued at 3 - 4 m/hr to 3022 m. While tripping at this depth, the hole was tight from 3022 m to 2738 m and from 2342 m to 2197 m, but ran back through okay.

Mud losses to the hole had by this time reached around 100 bbl/day, apparently due to filtration losses to permeable sandstones in the lower part of the hole. These filtration losses could have been responsible for the tight hole problems. New mud was periodically added to maintain volume and sump water was recycled to reduce the sump volume and also to reduce the consumption of KCl, since the sump water already had an 11,000 mg/l Chloride ion content. It was decided that no further remedial action to reduce losses would be taken.

DISCUSSION BY INTERVAL

$8^1/2$" HOLE (Cont'd)

SIDETRACK NO. 2 (Cont'd)

Drilling continued slowly at less than 2 m/hr. A trip at 3039 m was troublefree, but on the next trip at 3090 m, the hole was very tight from 1378 m to 1341 m and the string had to be pumped out, but ran back in without problems. As the slow drilling progressed at 1 - 2 m/hr, possible connection gas peaks were noted at 3183 m and 3192 m with a mud weight still at 10.1 ppg. The pumps were shut down for 5 mins and the gas resulting from this was 5 units above background, indicating the formation was becoming overpressured. At 3197 m the hole was circulated and the mud weight was increased to 10.4 ppg. Circulation continued whilst waiting on Barite and distinct cavings were noticed on the shakers. After again increasing the mud weight to 10.5 ppg, a connection gas of 2 units was recorded. This was lower than before, but it was felt that it was only very low because of the very tight formation, so the mud was further weighted to 10.6 ppg. Drilling continued to 3210 m, at which time connection gas was still evident, so the hole was again circulated and the weight increased to 10.8 ppg. A 5 stand wiper trip was run as an additional check, with an associated trip gas of 2 units.

Began to pull out for a bit change, but the hole was tight from bottom, and after pulling to the shoe, ran back in and reamed 5 singles back to bottom, with the mud weight again being increased to 11.2 ppg, and the viscosity raised to 58 seconds. Then pulled back to 3040 m and attempted to ream back to bottom with the hole again being very tight.

The next 3 days were spent attempting to ream back to bottom, with a trip to change the bit and another trip for a washout. Mud was still being periodically added to replace downhole losses and the mud weight was increased to 11.5 ppg. After eventually managing to ream back to bottom, a 20 stand wiper trip was run without problems, but while pulling out, the pipe became stuck at 1320 m. Despite continued jarring the pipe could not be freed.

The hole was then displaced with water, with a Hi-Vis pill pumped ahead and mud returns dumped until clear water was returned.

DISCUSSION BY INTERVAL

8 1/2" HOLE (Cont'd)

SIDETRACK NO. 2 (Cont'd)

The pipe was again jarred without result, so after running a freepoint survey, the pipe was backed off above the collars. On running back in with a bit to tag the top of the fish, the bit ran in 75 ft past the expected top, indicating the top of the fish was laying over in the hole. Ran back in with a bent sub and attempted to fish the BHA unsuccessfully.

The hole was then plugged and abandoned on 9th July 1985.

BEACH PETROLEUM
FAHLEY NO. 1

CONCLUSION AND RECOMMENDATIONS

All the major hole problems that occurred during this well were in the $8^1/2$" hole. Three distinct sections of the hole can be considered as the cause of these problems.

1. The Pember Mudstone became very badly washed out from 1150 to 1300 m in combination with an angle build up to 7^0 during drilling. The subsequent angle drop off to correct deviation caused frequent keyseating and hanging up of the BHA, in particular when pulling out of the hole and requiring frequent reaming when running back in. The problem first became apparent after losing the first fish in the hole and it was the cause of the stuck pipe which led to final abandonment. As the rest of the hole maintained good gauge, hydration doesn't appear to be responsible and the KCl content would appear to have been adequate. Instead the washing out of the Pember Mudstone can be considered as being due to mechanical weakness and erosion, in which case the only way to avoid this in future would be to case off most, if not all of the mudstone.

2. Frequent tight hole occurred on trips through the section from 2200 to 2500 m. It was also in this section that the first fish was lost at 2433 m when the string became stuck after the drawworks drive coupling broke. The amount of filter cake returns on the shakers after encountering tight hole through this section indicated a thick filter cake build up in close to gauge hole. The high daily mud losses, attributed to down hole filtration losses (up to 100 bbl/day), showed how highly permeable the sands in this section were. This combination of factors indicates very strongly that the BHA left in the hole at 2433 m was not packed off but probably differentially stuck, and may have been freed had it been treated as differential sticking, as advised by service company personnel.

3. The tight hole and increased reaming near T.D. was associated with the first occurrences of connection gas, which led to the mud weight being eventually increased up to 11.5 ppg. The connection gas and tight hole together indicate an increased formation pressure of unknown magnitude, as reaming failed to get back to T.D. before the hole was abandoned. As indicated by the very slow drill rates and the low gas readings, the formation was quite low in permeability and high in strength at this depth. In this situation, it is quite possible to drill through a large section of overpressured formation without any significant pressure indications, as

CONCLUSION AND RECOMMENDATIONS

the mechanical strength of the rock keeps the hole stable. Eventually the formation begins to destabilise and cave into the borehole. This instability, probably due to micro fractures in the rock, will then cause tight hole, even after the mud weight has been increased well past the formation pressure. Only prolonged reaming can re-establish some stability after raising the mud weight. This situation has occurred through the Belfast Formation in wells drilled offshore in the Otway Basin and I believe it has also occurred here. As the Paaratte Formation above was giving problems with high filtrate loss, which would be aggravated by mud weight increases, an additional casing string should be allowed for in the Belfast Formation, if it becomes necessary to weight up significantly.

The KCl mud used throughout this section behaved very consistently without problems and at quite reasonable cost, given the problems and the duration of the well. It might be worthwhile however, to consider an alternative KCl-AQUAGEL (as Q-MIX) - CMC system for drilling through the Paaratte Sands, in an attempt to produce a less permeable filter cake. The KCl would still give adequate inhibition for clay sections. In addition to these hole problems, it should also not be forgotten that rig mechanical failures and hole deviation were also major factors in the problems encountered in this well.

Baroid Australia PTY. LTD./NL INDUSTRIES INC.

MATERIAL RECAP

COMPANY	BEACH PETROLEUM	MUD TYPES	LIME FLOCCULATED GEL SPUD MUD	HOLE SIZE	17½"
WELL	FAHLEY NO. 1			INTERVAL TO	88.7m
LOCATION	PEP-105			FROM	5.4 m
COST/DAY	$868.33			MTRS DRILLED	83.3 m
COST/M	$ 20.85	CONTRACTOR	P.D.S.A. RIG 2		
COST/M³	$ 11.94	DRILLING DAYS/PHASE	2		
RECAPPED BY	M. OLEJNICZAK	ROTATING HRS/PHASE	10		
DATE	29 APRIL 1985			MUD CONSUMPTION FACTOR	1.75 m³/m

MATERIAL	UNIT	UNIT COST	ESTIMATED USED	ESTIMATED KG/M³	ACTUAL USED	ACTUAL KG/M³	TOTAL COST ESTIMATED	TOTAL COST ACTUAL
AQUAGEL	100 lb	13.50			114			1,539.00
CAUSTIC SODA.	40 kg	31.24			4			124.96
SODA ASH	40 kg	13.16			1			13.16
LIME	25 kg	4.58			13			59.54

CHEMICAL VOLUME	2.5 m³	
FRESH WATER	143 m³	
SEA WATER		
TOTAL MUD MADE	145.5 m³	
COST LESS BARYTES		
COST WITH BARYTES		$1,736.66

COMMENTS

PREHYDRATED GEL FLOCCULATED WITH CAUSTIC SODA AND LIME, WAS USED AS A SPUD MUD. FIVE SACKS OF CALCIUM CHLORIDE WERE USED FOR 13-3/8" CASING CEMENTATION.

Baroid Australia PTY. LTD./NL INDUSTRIES INC.

MATERIAL RECAP

COMPANY BEACH PETROLEUM
WELL FAHLEY NO.1
LOCATION PEP-105
COST/DAY $616.55
COST/M $ 2.84
COST/M³ $ 9.75
RECAPPED BY M. OLEJNICZAK
DATE 3 May 1985

MUD TYPES LIME-FLOCCULATED GEL, CHANGED TO FRESHWATER-GEL-CMC AT CASING DEPTH.

CONTRACTOR P.D.S.A. RIG 2
DRILLING DAYS/PHASE 4
ROTATING HRS/PHASE 27

HOLE SIZE $12\frac{1}{4}$"
INTERVAL TO 956 m
FROM 88.7 m
MTRS DRILLED 867.3 m

MUD CONSUMPTION FACTOR 0.29 m³/m

MATERIAL	UNIT	UNIT COST	ESTIMATED USED	ESTIMATED KG/M³	ACTUAL USED	ACTUAL KG/M³	TOTAL COST ESTIMATED	TOTAL COST ACTUAL
AQUAGEL	100 lb	13.50			147			1,984.50
CAUSTIC SODA	40 kg	31.24			5			156.20
SODA ASH	40 kg	13.16			4			52.64
LIME	25 kg	4.58			17			77.86
CMC-EHV	25 kg	39.00			5			195.00

CHEMICAL VOLUME	m³	3	
FRESH WATER	m³	250	
SEA WATER			
TOTAL MUD MADE	m³	253	
COST LESS BARYTES			
COST WITH BARYTES			$2,466.20

COMMENTS

LIME-FLOCCULATED GEL MUD CONTINUED FROM $17\frac{1}{2}$" HOLE.
SYSTEM DEFLOCCULATED WITH SODA ASH AND CMC FOR FILTRATION CONTROL PRIOR TO LOGGING.

Baroid Australia PTY. LTD./NL INDUSTRIES INC.

MATERIAL RECAP

COMPANY BEACH PETROLEUM
WELL FAHLEY NO.1
LOCATION PEP-105
COST/DAY $1,534.90
COST/M $ 44.24
COST/M³ $ 91.90
RECAPPED BY P. HUBBARD
DATE 9 JULY 1985

MUD TYPES KCl-POLYMER

CONTRACTOR P.D.S.A. RIG NO. 2
DRILLING DAYS/PHASE 65
ROTATING HRS/PHASE 624

HOLE SIZE 8½"
INTERVAL TO 3211 m
FROM 956 m
MTRS DRILLED 2255 m
MUD CONSUMPTION FACTOR 0.47 m³/m

MATERIAL	UNIT	UNIT COST	ESTIMATED USED	ESTIMATED KG/M³	ACTUAL USED	ACTUAL KG/M³	TOTAL COST ESTIMATED	TOTAL COST ACTUAL
BARITE	100 lb	6.21			1194	49.3		7,414.74
BARITE	50 kg	6.83			400	18.5		2,732.00
AQUAGEL	100 lb	13.50			10	0.4		135.00
CALCIUM CHLORIDE	25 kg	19.45			4	N/A		77.80
CAUSTIC SODA	40 kg	31.24			29	1.3		905.96
CMPOL	25 kg	95.16			192	4.4		18,270.72
CMC-EHV	25 kg	39.00			5	.1		195.00
FORMALDEHYDE	20 lt	33.17			5	-		165.85
MONPAC	25 kg	95.16			52	1.2		4,948.32
PAC-R	25 kg	95.16			60	1.4		5,709.60
SODA ASH	40 kg	13.16			17	0.8		223.72
SODIUM BICARBONATE	40 kg	17.91			20	0.6		358.20
STAFLO	25 kg	95.16			39	0.9		3,711.24
SURFLO W300	20 lt	58.60			2	-		117.20
XCD POLYMER	25 kg	279.86			71	1.5		19,870.06
EZ SPOT	200 lt	546.42			1	-		546.42
POTASSIUM CHLORIDE	50 kg	13.70			2510	116.3		34,387.00

CHEMICAL VOLUME	m³	45	
FRESH WATER	m³	1032	
SEA WATER	m³	-	
TOTAL MUD MADE	m³	1077	
COST LESS BARYTES			$89,622.09
COST WITH BARYTES			$99,768.83

COMMENTS

WATER USED TO DISPLACE HOLE WHEN STUCK NOT USED IN CALCULATIONS.

Baroid Australia PTY. LTD./NL INDUSTRIES INC.

MATERIAL SUMMARY

COMPANY	BEACH PETROLEUM	MUD TYPE	LIME-FLOCCULATED GEL, FRESHWATER-GEL-CMC KCl-POLYMER	HOLE SIZE	METRES DRILLED	DRILLING DAYS
WELL	FAHLEY NO. 1			$17\frac{1}{2}$"	83	2
LOCATION	PEP-105			$12\frac{1}{4}$"	867	4
COST/DAY	$1,465.75			$8\frac{1}{2}$"	2255	65
COST/M	$ 32.41	TOTAL ROTATING HRS	660			
COST/M³	$ 70.02	TOTAL DAYS ON HOLE	71			
RECAPPED BY	P.S. HUBBARD	TOTAL DEPTH	3211 m	TOTAL	3211 m	

MUD CONSUMPTION : WELL AVERAGE 0.46 m³/m

MATERIAL	UNIT	UNIT COST	ESTIMATED USED	ESTIMATED KG/M³	ACTUAL USED	ACTUAL KG/M³	TOTAL COST ESTIMATED	TOTAL COST ACTUAL
BARITE	100 lb	6.21			1194	35.9		7,414.74
BARITE	50 kg	6.83			400	13.5		2,732.00
AQUAGEL	100 lb	13.50			271	8.3		3,658.50
CALCIUM CHLORIDE	25 kg	19.45			9	0.1		175.05
CAUSTIC SODA	40 kg	31.24			38	1.3		1,187.12
CELPOL	25 kg	95.16			192	3.2		18,270.72
CMC-EHV	25 kg	39.00			10	0.1		390.00
FORMALDEHYDE	20 lt	33.17			5	N/A		165.85
LIME	25 kg	4.58			30	0.5		137.40
MONPAC	25 kg	95.16			52	0.9		4,948.32
PAC-R	25 kg	95.16			60	1.0		5,709.60
SODA ASH	40 kg	13.16			22	0.7		289.52
SODIUM BICARBONATE	40 kg	17.91			20	0.5		358.20
STAFLO	25 kg	95.16			39	0.7		3,711.24
SURFLO W300	20 lt	58.60			2	N/A		117.20
XCD POLYMER	25 kg	279.86			71	1.1		19,870.06
EZ SPOT	200 lt	546.42			1	N/A		546.42
POTASSIUM CHLORIDE	50 kg	13.70			2510	84.9		34,387.00

CHEMICAL VOLUME	m³	50	
FRESH WATER	m³	1425	
SEA WATER	m³	-	
TOTAL MUD MADE	m³	1475	
COST LESS BARYTES			$93,922.20
COST WITH BARYTES			$104,068.94
COMMENTS			

NL Baroid Australia PTY. LTD./NL INDUSTRIES INC.

DRILLING FLUID PROPERTY RECAP

COMPANY BEACH PETROLEUM WELL FAHLEY NO. 1

DATE 1985	DEPTH m	HOLE SIZE	TEMP °C	WEIGHT SG	VIS SEC	PV	YP	GELS 10 sec	GELS 10 min	WATER LOSS API	CAKE mm	pH	Pf	Mf	Cl mg/l	Ca mg/l	SAND %	SOLIDS %	WATER %	OIL %	MBC kg/m³	REMARKS TREATMENT	FORMATION
APRIL																							
28	88.7	$17\frac{1}{2}$	-	1.06	35	7	15	8	10	N/C	-	11	.6	.7	1000	1000	$\frac{1}{4}$	4	96	-	-	LIME FLOCCULATED GEL	LIMESTONE
29	88.7	"	-	1.06	35	7	15	8	10	N/C	-	11	.5	.6	1000	1000	$\frac{1}{4}$	4	96	-	-	RAN & CMTD $13\frac{3}{8}$" CSG	
30	301	$12\frac{1}{4}$	-	1.08	33	7	13	7	7	"	-	12	1.1	1.2	3500	80	$\frac{1}{4}$	4	96	-	-		
MAY																							
1	931	"	-	1.06	44	13	12	10	15	12	2	11.5	.7	.8	1000	40	Tr	4	96	-	-	CONDITIONED MUD FOR LOGGING	
2	956	"	-	1.07	40	12	11	5	12	13	3	11	.5	.6	1000	40	Tr	4	96	-	-	WIPER TRIP, LOGGING	
3	956	"	-	MUD DUMPED AND PITS WASHED OUT FOR NEW KCl-POLYMER MUD																		RAN AND CMTD 9-5/8" CSG	
4	1051	$8\frac{1}{2}$	_	1.07	42	18	19	2	4	7.6	1	11	.8	.9	31500	60	$\frac{1}{2}$	2	98	-	-	DRILL OUT CMT, DISPLACE MUD	MUDSTONE
5	1215	"	-	1.12	38	16	13	2	4	7.6	1	10	.3	.35	40500	80	Tr	5	98	-	-	DRILLING	MUDSTONE
6	1305	"	-	1.13	38	16	13	2	3	7.6	1	9.5	.1	.15	42000	160	Tr	$4\frac{1}{2}$	95.5	-	-	DRILLING	
7	1305	"	-	1.13	40	18	17	2	4	7.6	1	10	.1	.15	42000	100	Tr	$4\frac{1}{2}$	95.5	-	-	RAN TEST - FAILED	
8	1310	"	-	1.13	40	17	17	2	4	7.0	1	9.0	.05	.1	47500	150	Tr	$4\frac{1}{2}$	95.5	-	-	REPEATED TEST - FAILED	
9	1470	"	-	1.13	39	15	15	2	4	7.0	1	9.5	.25	.3	37500	80	Tr	4	96	-	-	DRILLING	
10	1725	"	-	1.13	40	15	15	2	4	7.0	1	9.0	.05	.1	37000	150	Tr	4	96	-	-	DRILLING	
11	1781	"	-	1.13	41	13	17	2	4	7.3	1	9.0	.1	.15	43000	110	Tr	$4\frac{1}{2}$	$95\frac{1}{2}$	-	-	DRILLING, REAMING	
12	1884	"	'	1.14	40	15	15	2	4	6.4	1	10.0	.2	.3	43000	60	Tr	$4\frac{1}{2}$	$95\frac{1}{2}$	-	-	REAMING, RESUMED DRILLING	
13	2036	"	-	1.15	40	15	15	2	4	6.8	1	10.0	.2	.3	41000	40	Tr	5	95	-	-	DRILLING	SAND, CLAY
14	2198	"	-	1.16	42	20	20	3	5	6.4	1	10.0	.5	.6	39500	30	Tr	$5\frac{1}{2}$	$94\frac{1}{2}$	-	-	DRILLING	SANDS
15	2322	"	-	1.15	39	16	16	2	4	6.4	1	9.0	.1	.15	39500	100	Tr	5	95	-	-	DRILLING	SAND, CLAY
16	2322	"	-	1.15	40	16	16	2	4	6.8	1	9.0	.1	.15	39500	100	Tr	5	95	-	-	TRIP FOR SURVEY TOOL	
17	2322	"	-	1.15	40	16	16	2	4	6.8	1	9.0	.1	.15	39500	100	Tr	5	95	-	-	PLUG BACK FOR SIDETRACK	
18	2322	"	-	1.15	48	25	25	2	5	7.5	1	12.0	.8	1.0	39000	240	Tr	5	95	-	-	DRILL CMT	
19	2322	"	-	RIG REPAIRS - NO CIRCULATION																			
20	2322	"	-	1.16	56	30	30	5	10	10.0	2	12.5	1.5	1.7	40000	600	0.5	6	94	-	-	RIH, DRILL CMT	
21	2322	"	-	1.16	50	25	25	3	6	8.5	1	12.5	1.6	1.8	40000	650	0.5	6	94	-	-	SET 2ND CMT PLUG	

Baroid Australia PTY. LTD./NL INDUSTRIES INC.

DRILLING FLUID PROPERTY RECAP

COMPANY BEACH PETROLEUM WELL FAHLEY NO. 1

DATE 1985	DEPTH m	HOLE SIZE	TEMP °C	WEIGHT SG	VIS SEC	PV	YP	GELS 10 sec	GELS 10 min	WATER LOSS API	CAKE mm	pH	Pf	Mf	Cl mg/l	Ca mg/l	SAND %	SOLIDS %	WATER %	OIL %	MBC kg/m³	REMARKS TREATMENT FORMATION
MAY																						
22	2322	8½	-	1.16	39	19	16	2	4	9.8	1	12.5	1.9	2.1	39000	640	Tr	6	94	-	-	TEST B.O.P., DRILL CMT
23	2171	"	-	1.15	40	18	18	2	4	7.8	1	12.5	1.1	1.3	40000	450	Tr	4½	95½	-	-	CONTROL DRILL TO KICK OFF
24	2212	"	-	1.14	40	20	15	2	4	7.8	1	12.0	1.1	1.2	39000	500	Tr	4	96	-	-	CONTROL DRILL, CHANGE BHA
25	2354	"	-	1.15	45	27	27	2	4	6.4	1	11.0	.5	.7	38000	200	Tr	4½	95½	-	-	DRILLING
26	2430	"	-	1.16	50	29	27	3	5	6.0	1	11.0	.4	.5	39000	160	Tr	5	95	-	-	DRILLING SHALE, SAND
27	2433	"	-	1.16	50	30	30	2	5	5.6	1	10.0	.3	.4	39000	160	Tr	5	93	2	-	BREAKDOWN, STUCK IN HOLE.
28	2433	"	-	1.16	50	29	29	2	5	5.8	1	10.0	.3	.4	39000	150	Tr	5	93	2	-	RAN FREE POINT, BACKED OFF.
29	2433	"	-	1.16	50	29	29	2	4	5.8	1	10.0	.3	.4	39000	150	Tr	5	93	2	-	SET CMT PLUG
30	2433	"	-	1.15	47	25	20	2	4	5.4	1	12.0	.9	1.1	40000	480	Tr	4	94	1	-	DRILL CMT, STUCK PIPE
31	2433	"	-	1.16	53	30	30	2	5	5.4	1	11.5	.5	.6	40500	280	Tr	5	95	-	-	REAMING, TIGHT HOLE
JUNE																						
1	2156	"	-	1.16	48	26	23	2	4	6.4	1	12.0	1.1	1.3	39500	410	Tr	5	95	-	-	KICK OFF WITH DYNA DRILL
2	2156	"	-	1.17	48	28	26	2	5	5.5	1	10.5	0.4	0.5	40000	110	Tr	6	94	-	-	WIPER TRIP
3	2156	"	-	1.16	48	28	26	2	5	5.5	1	10.5	0.4	0.5	40000	110	Tr	6	94	-	-	LOGGING, RIH
4	2156	"	-	1.16	44	22	21	2	4	6.0	1	9.0	0.05	0.1	44000	130	Tr	5	95	-	-	REAMING
5	2156	"	-	1.16	49	22	22	2	4	5.0	1	9.0	0.05	0.1	45000	120	Tr	5	95	-	-	REAMING
6	2192	"	-	1.16	50	22	24	2	4	6.3	1	9.0	0.05	0.1	45000	120	Tr	5	95	-	-	DRILLING
7	2246	"	-	1.16	50	22	23	2	4	6.4	1	9.5	0.1	0.2	47000	120	Tr	5	95	-	-	DRILLING, BIT CHANGE
8	2359	"	-	1.18	52	26	33	2	5	6.6	1	9.5	0.1	0.2	56000	150	0.1	5	95	-	-	DRILLING, INCREASE YP AND KCl%
9	2402	"	-	1.18	52	25	32	2	5	6.6	1	9.0	0.05	0.1	58000	150	0.1	5	95	-	-	DRILLING
10	2448	"	-	1.21	58	31	36	3	6	6.0	1	9.0	0.05	0.1	61000	150	0.1	6	94	-	-	DRILLING
11	2553	"	-	1.21	52	28	31	2	6	6.2	1	9.5	0.1	0.3	56000	150	0.1	6	94	-	-	DRILLING
12	2637	"	-	1.21	48	27	30	2	6	6.4	1	8.5	0.05	0.1	56000	200	0.1	6	94	-	-	DRILLING
13	2701	"	-	1.21	51	27	31	2	6	6.4	1	9.5	0.1	0.25	56000	140	0.1	6	94	-	-	DRILLING
14	2703	"	-	1.21	50	27	30	2	5	6.4	1	9.0	0.05	0.15	56000	140	0.1	6	94	-	-	DRILLING, BIT CHANGE

Baroid Australia PTY. LTD./NL INDUSTRIES INC.

DRILLING FLUID PROPERTY RECAP

COMPANY BEACH PETROLEUM   WELL FAHLEY NO. 1

DATE 1985	DEPTH m	HOLE SIZE	TEMP °C	WEIGHT SG	VIS SEC	PV	YP	GELS 10 sec	GELS 10 min	WATER LOSS API	CAKE mm	pH	Pf	Mf	Cl mg/l	Ca mg/l	SAND %	SOLIDS %	WATER %	OIL %	MBC kg/m³	REMARKS TREATMENT FORMATION
JUNE																						
15	2737	8½	-	1.21	54	29	38	2	7	6.0	1	9.0	0.1	0.2	60000	140	0.1	6	94	-	-	REAMING, DRILLING
16	2760	"	-	1.21	52	28	36	2	6	6.2	1	9.0	0.05	0.15	60000	200	0.1	6	94	-	-	DRILLING, BIT CHANGE
17	2829	"	-	1.21	51	28	35	2	6	6.3	1	9.5	0.1	0.25	59000	200	0.1	6	94	-	-	DRILLING
18	2840	"	-	1.21	53	29	31	2	6	5.6	1	9.5	0.15	0.3	55000	160	0.1	6	94	-	-	DRILLING, BIT CHANGE
19	2925	"	-	1.21	49	30	32	2	6	5.8	1	9.0	0.1	0.2	56000	120	0.1	6	94	-	-	DRILLING, BIT CHANGE
20	2941	"	-	1.21	50	29	31	2	6	6.2	1	9.0	0.1	0.2	57000	160	0.1	6	94	-	-	DRILLING
21	3005	"	-	1.21	49	24	30	2	6	6.2	1	9.5	0.15	0.3	57000	200	0.1	6	94	-	-	DRILLING
22	3028	"	-	1.21	52	27	35	2	6	5.8	1	9.5	0.15	0.3	58000	160	0.1	6	94	-	-	DRILLING, WIPER TRIP
23	3043	"	-	1.21	52	26	30	2	6	5.6	1	9.5	0.15	0.3	60000	160	0.1	6	94	-	-	DRILLING, BIT CHANGE
24	3079	"	-	1.21	55	27	34	2	6	5.6	1	9.5	0.1	0.3	61000	160	0.1	6	94	-	-	DRILLING
25	3095	"	-	1.21	48	24	28	2	5	6.0	1	9.5	0.1	0.3	59000	160	0.1	6	94	-	-	DRILLING, BIT CHANGE
26	3122	"	-	1.21	47	23	28	2	5	5.8	1	9.5	0.1	0.3	59000	160	0.1	6	94	-	-	DRILLING
27	3152	"	-	1.21	48	24	28	2	6	5.8	1	9.5	0.15	0.35	58000	160	0.1	6	94	-	-	DRILLING, WIPER TRIP
28	3197	"	-	1.25	49	24	26	2	6	6.5	1	9.5	0.15	0.3	58000	160	0.1	8	92	-	-	DRILLING, WEIGHT UP.
29	3210	"	-	1.30	45	22	24	3	8	8.6	1	9.5	0.1	0.3	57000	160	0.2	12	88	-	-	DRILLING, WEIGHT UP
30	3210	"	-	1.34	58	28	30	10	13	7.8	1	9.5	0.2	0.4	57000	180	0.3	14	86	-	-	REAMING, WEIGHT UP
JULY																						
1	3210	"	-	1.34	54	29	28	7	10	8.2	1	9.0	0.1	0.3	55000	160	.5	14	86	-	-	BIT CHANGE, REAM
2	3210	"	-	1.34	58	30	29	6	10	7.0	1	10.0	0.2	0.5	54000	160	.2	14	86	-	-	REAM, 3030 - 3085 m
3	3210	"	-	1.34	57	32	34	8	12	7.4	1	10.0	.1	.8	52000	200	.3	16	84	-	-	REAM
4	3211	"	-	1.35	56	30	32	7	16	7.6	1	10.0	.1	.7	58000	200	.3	18	82	-	-	BACK REAM TO POOH
5	3211	"	-	1.02	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	STUCK, DISPLACE WITH WATER
6	3211	"	-	1.02	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FISHING
9	3211	"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P & A

Baroid Australia PTY. LTD./NL INDUSTRIES INC.

BIT RECORD

COMPANY BEACH PETROLEUM WELL FAHLEY NO. 1 CONTRACTOR/RIG P.D.S.A. RIG 2

LOCATION DARTMOOR, VICTORIA PEP 105 SPUD DATE 28 APRIL 1985 DATE REACHED T.D.

COMPANY SUPERVISORS J. OZOLINS, V. SANTO STEFANO TOOLPUSHERS B. FOWLER, L. BROWN

PUMPS: MAKE, TYPE G.D. PZ8 LINERS USED 6" x 8" DRILL COLLARS 8", $6\frac{1}{4}$" DRILL PIPE $4\frac{1}{2}$"

MUD SYSTEMS, DEPTHS LIME FLOCCULATED GEL TO 956 m; KCl-PCLYMER TO 3211 m

DATE 1985	No	SIZE	MAKE	TYPE	JETS 32nd"	DEPTH OUT m	METRES DRILLED	HOURS	MTRS HR	ACCUM DRLG HOURS	BIT WEIGHT tonnes	RPM	VERT DEV'N	PUMP PRESSURE psi	PUMP RATE spm	WT SG	MUD VIS sec	CONDITION T	B	G	FORMATION	REMARKS
APRIL																						
29	1RR	$17\frac{1}{2}$	HTC	OSC3AJ	3x24	89		10	-	10	5-10	150	1°	300	215	1.06	35	2	4	I	SURFACE CSG	
MAY																						
2	2	$12\frac{1}{4}$	VAREL	L114	3x16	956	867	$27\frac{1}{4}$	31.8	$37\frac{1}{4}$	9-11	140	2°	1450	195	1.06	35	4	4	I	INTERMED.CSG	
5	3	$8\frac{1}{2}$	HTC	X3A	9,9,10	1215	259	$19\frac{1}{4}$	13.6	$56\frac{1}{2}$	11-14	120	7°	1800	100	1.09	90	7	7	1/8	SLOW R.O.P.,	PULLED
7	4	"	"	J11	3x9	1305	90	$10\frac{1}{4}$	8.8	$66\frac{3}{4}$	9-11	100	$5\frac{1}{4}$°	1900	100	1.13	38	2	1	I	PULLED FOR D.S.T.	
11	RR4	"	"	J11	3x9	1781	476	$42\frac{3}{4}$	11.1	$109\frac{1}{2}$	9-14	80/100	$1\frac{3}{4}$	2000	96	1.13	40	6	6	1/8	PULLED FOR TORQUE	
13	5	"	"	J11	9,9,10	2029	248	24	10.3	$133\frac{1}{2}$	11-14	80/100	$2\frac{1}{2}$°	2000	96	1.14	40	4	2	3/16	PULLED FOR TORQUE, SLOW ROP	
16	6	"	"	J11	9,9,10	2322	293	$27\frac{3}{4}$	10.6	$161\frac{1}{4}$	14	80	12°	1900	96	1.14	40	3	2	I	POOH FOR BHA CHANGE	
21	7	"	"	XOG	9,9,10	2251	136	$14\frac{3}{4}$	-	176	1-2	110	12°	2000	96	1.16	50	2	2	I	DRILL CMT, SIDETRACK	
24	RR7	"	"	XDG	3x10	2181	102	$23\frac{1}{4}$	-	$199\frac{1}{4}$	1-4	125	5°	1800	80	1.15	40	5	5	1/16	DRILL CMT, SIDETRACK	
27	8	"	"	J11	3x10	2433	252	$51\frac{3}{4}$	4.9	251	9-11	100/125	$2\frac{3}{4}$°	1700	96	1.15	50	LEFT IN HOLE,CEMENTED IN WITH BHA				
30	9	"	"	XDG	3x10	2088	35	2	17.5	253	4	100	-	1300	86	1.15	47	1	1	$\frac{1}{4}$	PINCHED, POH THRU TIGHT SEC	
31	10RR	"	"	XDG	3x10	2088	-	-	-	263	4	100	-	2000	105	1.16	47	4	4	1/16	REAMED, WIPER TRIP	
JUNE																						
1	11	"	"	XDG	3x18	2156	68	$11\frac{1}{2}$	-	$264\frac{1}{2}$	2	350/400	$2\frac{3}{4}$°	1100	110	1.16	48	7	7	1/8	SIDETRACK WITH DYNA DRILL	
2	RR10RR	"	"	XDG	3x10	2156	-	-	-	$264\frac{1}{2}$	2/7	120	-	1800	110	1.16	48	5	5	1/8	REAMING, WIPER TRIP FOR LOG	
4	12	"	"	J11	3x10	2201	45	$9\frac{1}{4}$	4.9	$273\frac{3}{4}$°	2/7	120	2	2000	115	1.16	50	2	2	1/8	$41\frac{1}{2}$ HRS REAMING	
7	13	"	"	J11	12,12,13	2426	225	$47\frac{1}{2}$	4.7	$321\frac{1}{4}$	9/14	120/100	$4\frac{3}{4}$°	1500	115	1.18	52	4	2	1/8	POH FOR HIGH TORQUE,SLOW ROP	
9	14	"	"	J22	12,13,13	2702	276	68	4.1	$389\frac{1}{4}$	11/14	80/90	$1\frac{1}{4}$°	1450	115	1.21	51	3	3	1/16	POH FOR TORQUE AND HOURS	
15	15	"	"	XDG	12,13,13	2761	59	20	3.0	$409\frac{1}{4}$	12/14	90	$1\frac{1}{4}$	1500	115	1.21	54	6	6	1/16	REAMED, PULLED FOR ROP	
18	16	"	"	J22	12,13,13	2832	71	32	2.2	$441\frac{1}{4}$	11/16	50/90	-	1500	115	1.21	54	1	BF	1/8	9BT MI BF2,LOST BALLS	

Baroid Australia PTY. LTD./NL INDUSTRIES INC.

BIT RECORD

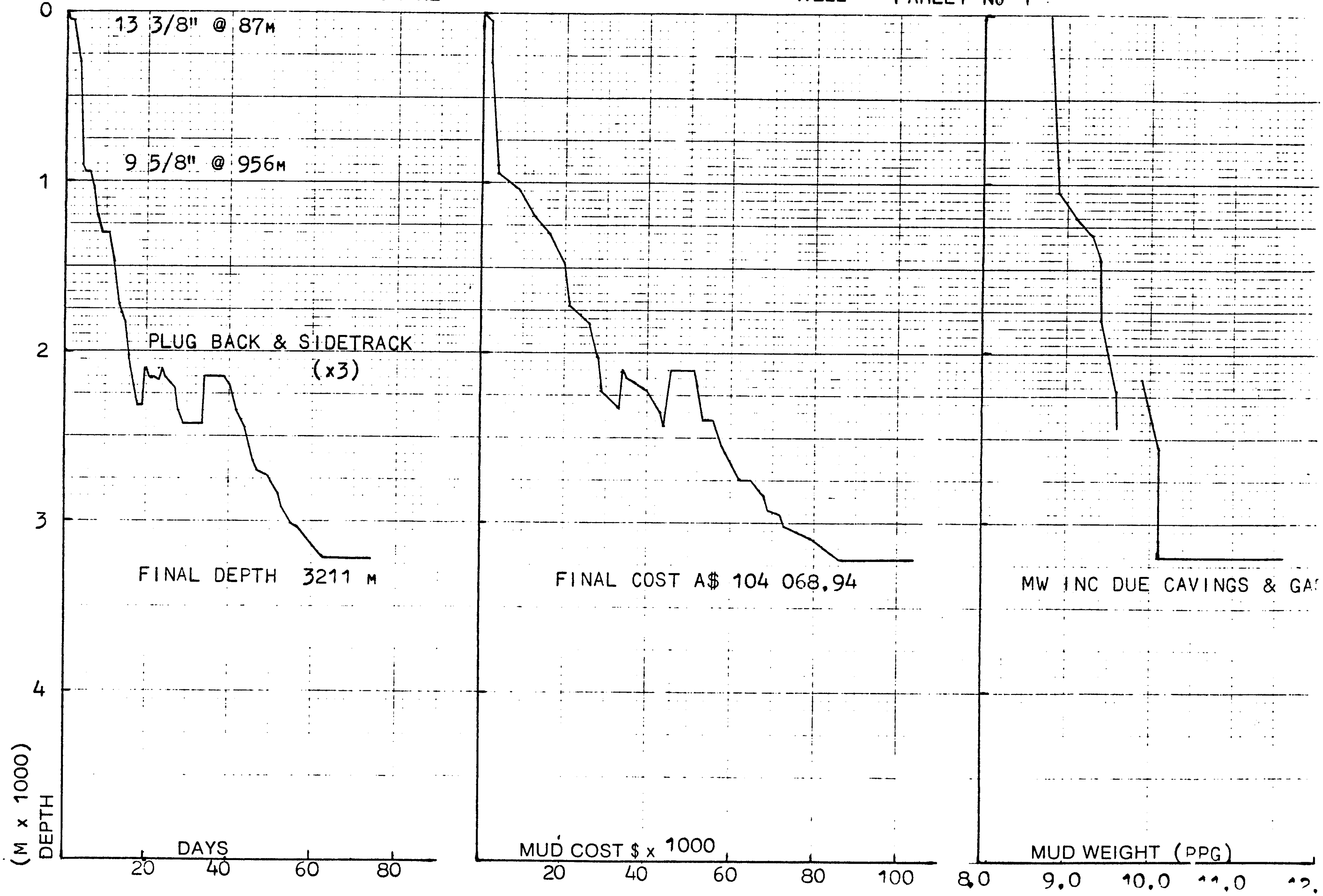
DATE 1985	No	SIZE	MAKE	TYPE	JETS 32nd"	DEPTH OUT m	METRES DRILLED	HOURS	MTRS/ HR	ACCUM DRLG HOURS	BIT WEIGHT tonnes	RPM	VERT DEV'N	PUMP PRESSURE p.s.i.	PUMP RATE spm	WT S.G.	MUD VIS sec	CONDITION T	B	G	FORMATION	REMARKS
JUNE																						
19	17	$8\frac{1}{2}$	HTC	XDG	12,13,13	2925	93	$23\frac{1}{2}$	3.9	$464\frac{3}{4}$	14	80	-	1500	115	1.21	49	5	4	1/16		PULLED : HOURS, SLOW ROP
20	18	"	"	J22	12,13,13	3039	112	$45\frac{1}{4}$	2.5	510	11/16	55/70	3°	1500	115	1.21	52	1	SE	1/16		PULLED FOR LOW ROP
23	19	"	"	J03	12,13,13	3094	55	$38\frac{3}{4}$	1.4	$548\frac{3}{4}$	17	65/70	-	1600	117	1.21	52	4	BF	1/16		NR-BF2,LOST BALLS
26	20	"	"	J22	12,13,13	3210	117	$61\frac{1}{4}$	1.9	660	14	70	$2\frac{1}{2}$	1900	115	1.34	57	3	SE	1/4		
JULY																						
1	21	"	"	J22	12,13,13	-	-	-	-	-	1-2	75	$2\frac{1}{2}$	1900	115	1.34	57	-	-	-		STUCK IN HOLE

Baroid Australia PTY. L[illegible] NL INDUSTRIES INC.

GRAPH SUMMARY

OPERATOR BEACH PETROLEUM NL

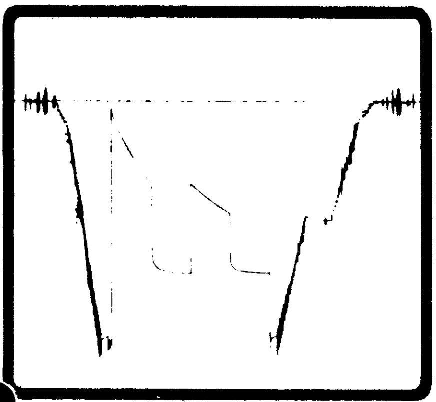
WELL FAHLEY No 1



APPENDIX 4

DST REPORTS

FORMATION TESTING SERVICE REPORT



HALLIBURTON
SERVICES

Duncan, Oklahoma 73536

A Halliburton Company

NOMENCLATURE

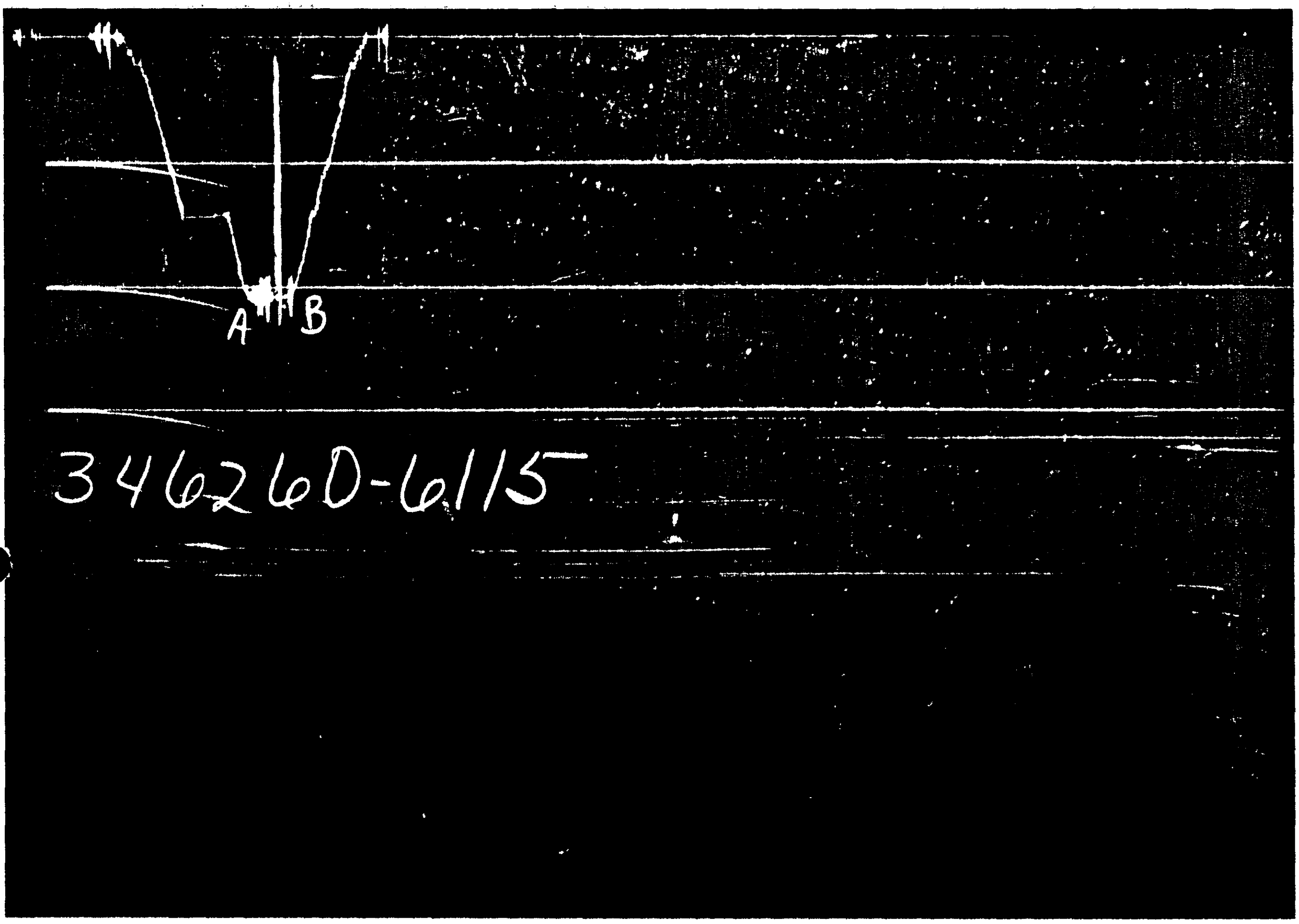
B	=	Formation Volume Factor (Res Vol Std Vol)	——
c_t	=	System Total Compressibility	(Vol Vol) psi
DR	=	Damage Ratio	——
h	=	Estimated Net Pay Thickness	Ft
k	=	Permeability	md
m	=	(Liquid) Slope Extrapolated Pressure Plot	psi cycle
		(Gas) Slope Extrapolated m(P) Plot	MM psi^2 cp cycle
$m(P^*)$	=	Real Gas Potential at P^*	MM psi^2 cp
$m(P_f)$	=	Real Gas Potential at P_f	MM psi^2 cp
AOF_1	=	Maximum Indicated Absolute Open Flow at Test Conditions	MCFD
AOF_2	=	Minimum Indicated Absolute Open Flow at Test Conditions	MCFD
P^*	=	Extrapolated Static Pressure	Psig
P_f	=	Final Flow Pressure	Psig
Q	=	Liquid Production Rate During Test	BPD
Q_1	=	Theoretical Liquid Production w Damage Removed	BPD
Q_g	=	Measured Gas Production Rate	MCFD
r_i	=	Approximate Radius of Investigation	Ft
r_w	=	Radius of Well Bore	Ft
S	=	Skin Factor	
t	=	Total Flow Time Previous to Closed-in	Minutes
Δt	=	Closed-in Time at Data Point	Minutes
T	=	Temperature Rankine	R
ϕ	=	Porosity	——
μ	=	Viscosity of Gas or Liquid	cp
Log	=	Common Log	

HALLIBURTON SERVICES

TICKET NO. 34626000
16-DEC-85
MOOMBA

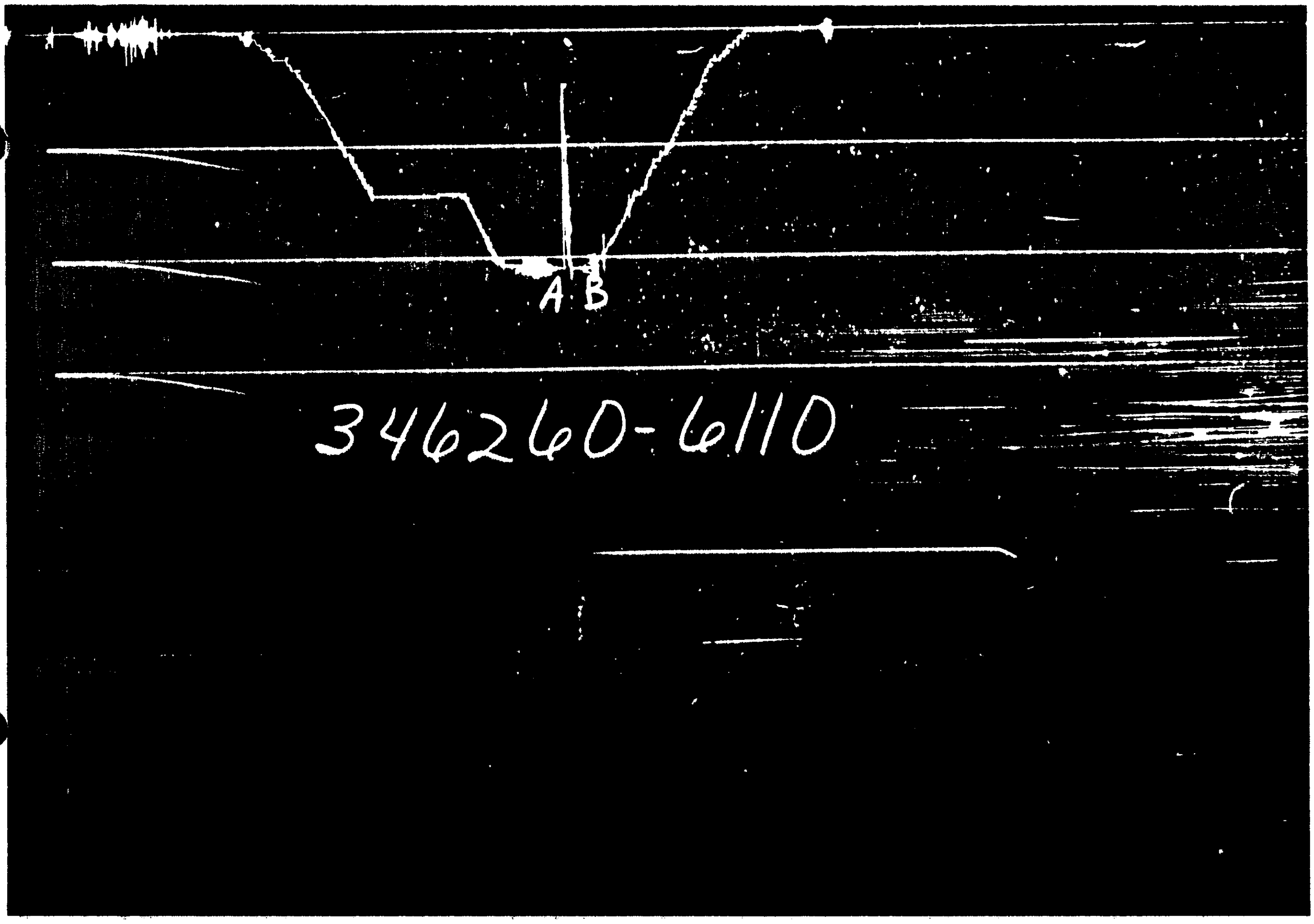
FORMATION TESTING SERVICE REPORT

LEASE NAME	FAHLEY
WELL NO.	1
TEST NO.	1
TESTED INTERVAL	4213.0 - 4257.0
LEASE OWNER/COMPANY NAME	BEACH PETROLEUM N.L.
LEGAL LOCATION SEC. - TWP. - RNG.	SEE REMARKS
FIELD AREA	OTWAY BASIN
COUNTY	VICTORIA
STATE	AUSTRALIA BG



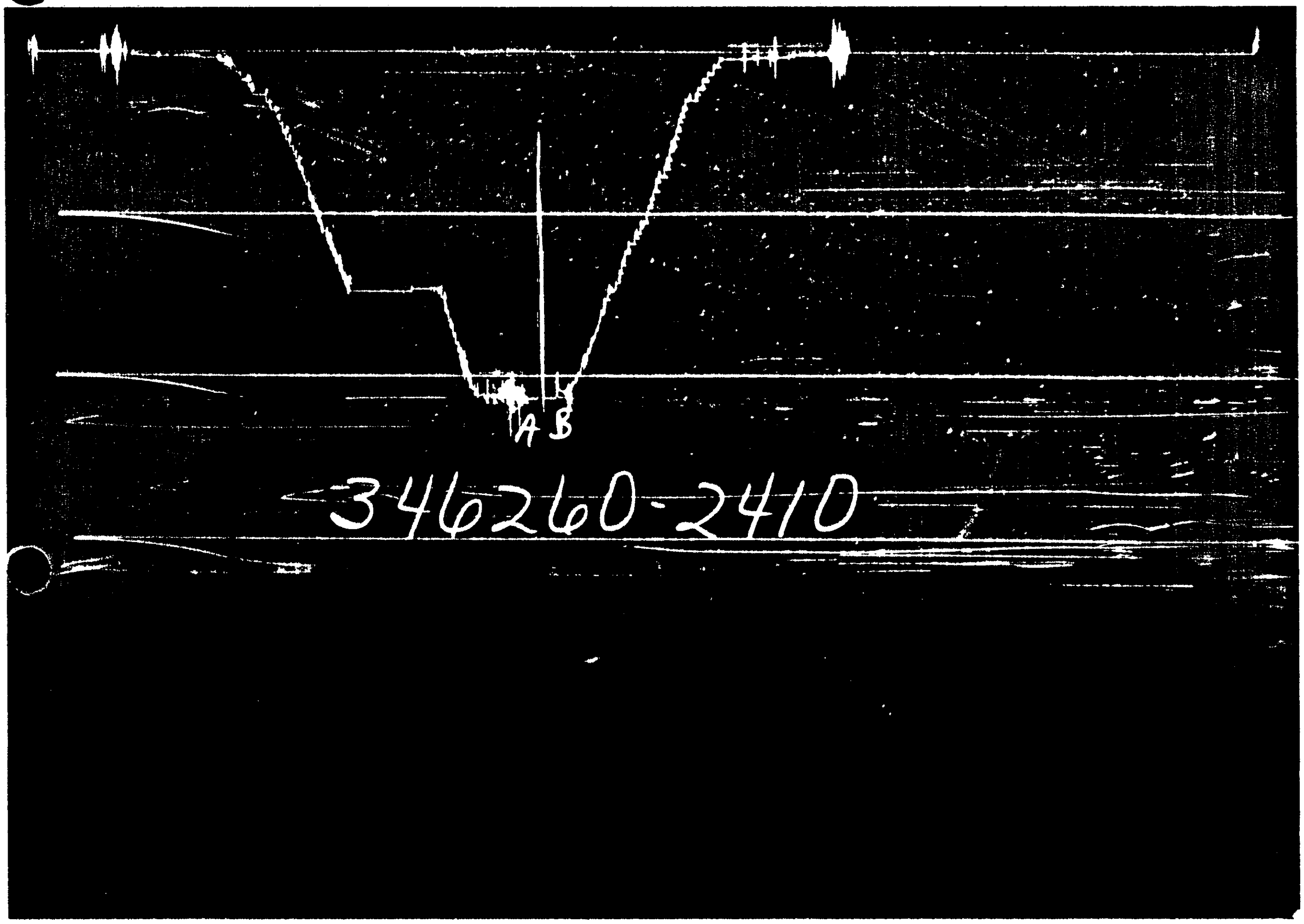
GAUGE NO: 6115 DEPTH: 4196.9 BLANKED OFF: NO HOUR OF CLOCK: 48

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC	2017	2083.6			
B	FINAL HYDROSTATIC	2013	2083.6			



GAUGE NO: 6110 DEPTH: 4233.0 BLANKED OFF: NO HOUR OF CLOCK: 24

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC	2052	2099.5			
B	FINAL HYDROSTATIC	2052	2099.5			



GAUGE NO: 2410 DEPTH: 4277.9 BLANKED OFF: YES HOUR OF CLOCK: 24

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC	2130	2145.4			
B	FINAL HYDROSTATIC	2130	2141.2			

EQUIPMENT & HOLE DATA

FORMATION TESTED: PEMBER
NET PAY (ft):
GROSS TESTED FOOTAGE: 44.0
ALL DEPTHS MEASURED FROM: KB
CASING PERFS. (ft):
HOLE OR CASING SIZE (in): 8.500
ELEVATION (ft): 145.3
TOTAL DEPTH (ft): 4281.0
PACKER DEPTH(S) (ft): 4213, 4257
FINAL SURFACE CHOKE (in):
BOTTOM HOLE CHOKE (in): 0.750
MUD WEIGHT (lb/gal): 9.40
MUD VISCOSITY (sec):
ESTIMATED HOLE TEMP. (°F):
ACTUAL HOLE TEMP. (°F): 128 @ 4276.9 ft

TICKET NUMBER: 34626000

DATE: 5-7-85 TEST NO: 1

TYPE DST: ON BTM. STRADDLE

HALLIBURTON CAMP: MOOMBA

TESTER: COLIN HUON

WITNESS: VINCE SANTOSTEFANO

DRILLING CONTRACTOR: P.D.S.A. RIG #2

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:

RAT HOLE MUD

MEASURED FROM TESTER VALVE

REMARKS:

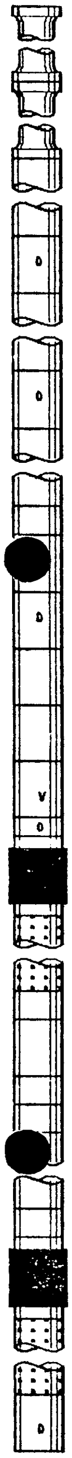
TEST WAS CONDUCTED ON 7 MAY 1985.

LEGAL LOCATION = LAT. 37 DEGREES 57' 22.318" SOUTH
LONG. 141 DEGREES 02' 48.152" EAST.

MISRUN.....LOST PACKER SEAT.

TYPE & SIZE MEASURING DEVICE: 6" CERAMIC CHOKE					TICKET NO: 34626000
TIME	CHOKE SIZE	SURFACE PRESSURE PSI	GAS RATE MCF	LIQUID RATE BPD	REMARKS
5-7-85					
0514					STARTED MAKING UP TOOLS
0835					FINISHED MAKING UP TOOLS. TOOLS
					THROUGH ROTARY TABLE.
1345					HEAD ON
1355					LINES RIGGED TO MANIFOLD AND
					FLOW LINE
1356					TAGGED BOTTOM. HALLIBURTON
					OPERATOR OUT IN TALLY. PICKED
					UP SINGLE.
1415					TAGGED BOTTOM
1418	.5				TOOL OPENED
1420					NO BLOW AT BUBBLE HOSE
1425					SAME
1430					SAME
1432					LOST PACKER SEAT. PULLED TOOLS
					FREE.
1800					TOOLS THROUGH ROTARY TABLE
1940					TOOLS LAID DOWN....MISRUN.

TICKET NO. 34626000



		O.D.	I.D.	LENGTH	DEPTH
1	DRILL PIPE......................	4.750		3724.8	
4	FLEX WEIGHT.....................	4.500	2.500	182.2	
3	DRILL COLLARS...................	4.500	2.375	214.5	
51	PUMP OUT REVERSING SUB..........	6.000	3.000	1.0	4122.4
3	DRILL COLLARS...................	4.500	2.375	30.6	
50	IMPACT REVERSING SUB............	6.000	3.000	1.0	4155.0
3	DRILL COLLARS...................	4.500	2.375	30.0	
5	CROSSOVER.......................	5.000	2.250	1.0	
12	DUAL CIP VALVE..................	5.000	0.870	4.9	
60	HYDROSPRING TESTER..............	5.000	0.750	5.0	4194.9
80	AP RUNNING CASE.................	5.000	2.250	4.1	4196.9
15	JAR.............................	5.000	1.750	5.0	
16	VR SAFETY JOINT.................	5.000	1.000	2.8	
17	PRESSURE EQUALIZING CROSSOVER...	5.000	2.500	1.0	
70	OPEN HOLE PACKER................	7.050	1.530	5.9	4212.9
20	FLUSH JOINT ANCHOR..............	5.000	2.370	16.0	
5	CROSSOVER.......................	5.000	2.500	1.0	
80	AP RUNNING CASE.................	5.000	2.250	4.1	4233.0
5	CROSSOVER.......................	5.000	2.500	0.7	
5	CROSSOVER.......................	6.000	3.000	0.9	
3	DRILL COLLARS...................	6.250	2.812	14.8	
5	CROSSOVER.......................	6.000	3.000	0.7	
70	OPEN HOLE PACKER................	7.050	1.530	5.9	4257.0
20	FLUSH JOINT ANCHOR..............	5.000	2.370	17.0	
81	BLANKED-OFF RUNNING CASE........	5.000		4.1	4277.9
	TOTAL DEPTH				4281.0

EQUIPMENT DATA

EQUATIONS FOR DST LIQUID WELL ANALYSIS

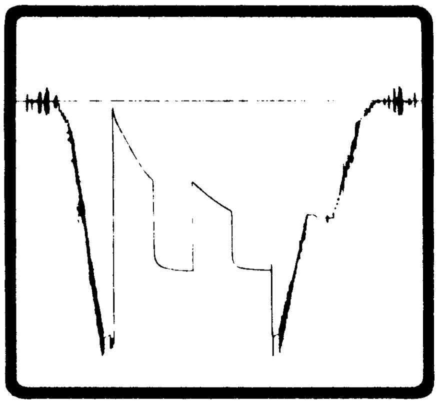
Transmissibility	$\frac{kh}{\mu} \cdot \frac{162.6\ QB}{m}$	$\frac{md\text{-}ft}{cp}$
Indicated Flow Capacity	$kh \quad \frac{kh}{\mu}\ \mu$	md-ft
Average Effective Permeability	$k - \frac{kh}{h}$	md
Skin Factor	$S \quad 1.151 \left[\frac{P^* \quad P_f}{m} \qquad LOG\left(\frac{k(t/60}{\phi\ \mu\ C_t r_w^2}\right) + 3.23 \right]$	—
Damage Ratio	$DR \quad \frac{P^* \quad P_f}{P^* \quad P_f \quad 0.87\ mS}$	—
Theoretical Potential w Damage Removed	$Q_1 \quad Q\ DR$	BPD
Approx. Radius of Investigation	$r_i \quad 0.032 \sqrt{\frac{k(t/60)}{\phi \mu C_t}}$	ft

EQUATIONS FOR DST GAS WELL ANALYSIS

Indicated Flow Capacity	$kh \quad \frac{1637\ Q_g\ T}{m}$	md-ft
Average Effective Permeability	$k \quad \frac{kh}{h}$	md
Skin Factor	$S \quad 1.151 \left[\frac{m(P^*) \quad m(P_f)}{m} \qquad LOG\left(\frac{k(t/60)}{\phi\ \mu\ C_t r_w^2}\right) \cdot 3.23 \right]$	—
Damage Ratio	$DR \quad \frac{m(P^*) \quad m(P_f)}{m(P^*) \quad m(P_f) \quad 0.87\ mS}$	—
Indicated Flow Rate (Maximum)	$AOF_1 \quad \frac{Q_g\ m(P^*)}{m(P^*) \quad m(P_f)}$	MCFD
Indicated Flow Rate (Minimum)	$AOF_2 \quad Q_g \sqrt{\frac{m(P^*)}{m(P^*) - m(P_f)}}$	MCFD
Approx. Radius of Investigation	$r_i - 0.032 \sqrt{\frac{k(t/60)}{\phi \mu C_t}}$	ft

AT.

FORMATION TESTING SERVICE REPORT



FAHLEY
LEASE NAME

1
WELL NO.

2
TEST NO.

4201.0 - 4253.0
TESTED INTERVAL

BEACH PETROLEUM N.L.
LEASE OWNER/COMPANY NAME

31 DEC 1985

HALLIBURTON SERVICES

Duncan, Oklahoma 73536

A Halliburton Company

1296-R5 Southwestern

NOMENCLATURE

B	= Formation Volume Factor (Res Vol Std Vol)	——
c_t	= System Total Compressibility	(Vol Vol) psi
DR	= Damage Ratio	——
h	= Estimated Net Pay Thickness	Ft
k	= Permeability	md
m	= (Liquid) Slope Extrapolated Pressure Plot	psi cycle
	(Gas) Slope Extrapolated m(P) Plot	MM psi^2 cp cycle
$m(P^*)$	= Real Gas Potential at P^*	MM psi^2 cp
$m(P_f)$	= Real Gas Potential at P_f	MM psi^2 cp
AOF_1	= Maximum Indicated Absolute Open Flow at Test Conditions	MCFD
AOF_2	= Minimum Indicated Absolute Open Flow at Test Conditions	MCFD
P^*	= Extrapolated Static Pressure	Psig
P_f	= Final Flow Pressure	Psig
Q	= Liquid Production Rate During Test	BPD
Q_1	= Theoretical Liquid Production w Damage Removed	BPD
Q_g	= Measured Gas Production Rate	MCFD
r_i	= Approximate Radius of Investigation	Ft
r_w	= Radius of Well Bore	Ft
S	= Skin Factor	
t	= Total Flow Time Previous to Closed-in	Minutes
Δt	= Closed-in Time at Data Point	Minutes
T	= Temperature Rankine	R
ϕ	= Porosity	——
μ	= Viscosity of Gas or Liquid	cp
Log	= Common Log	

HALLIBURTON

SERVICES

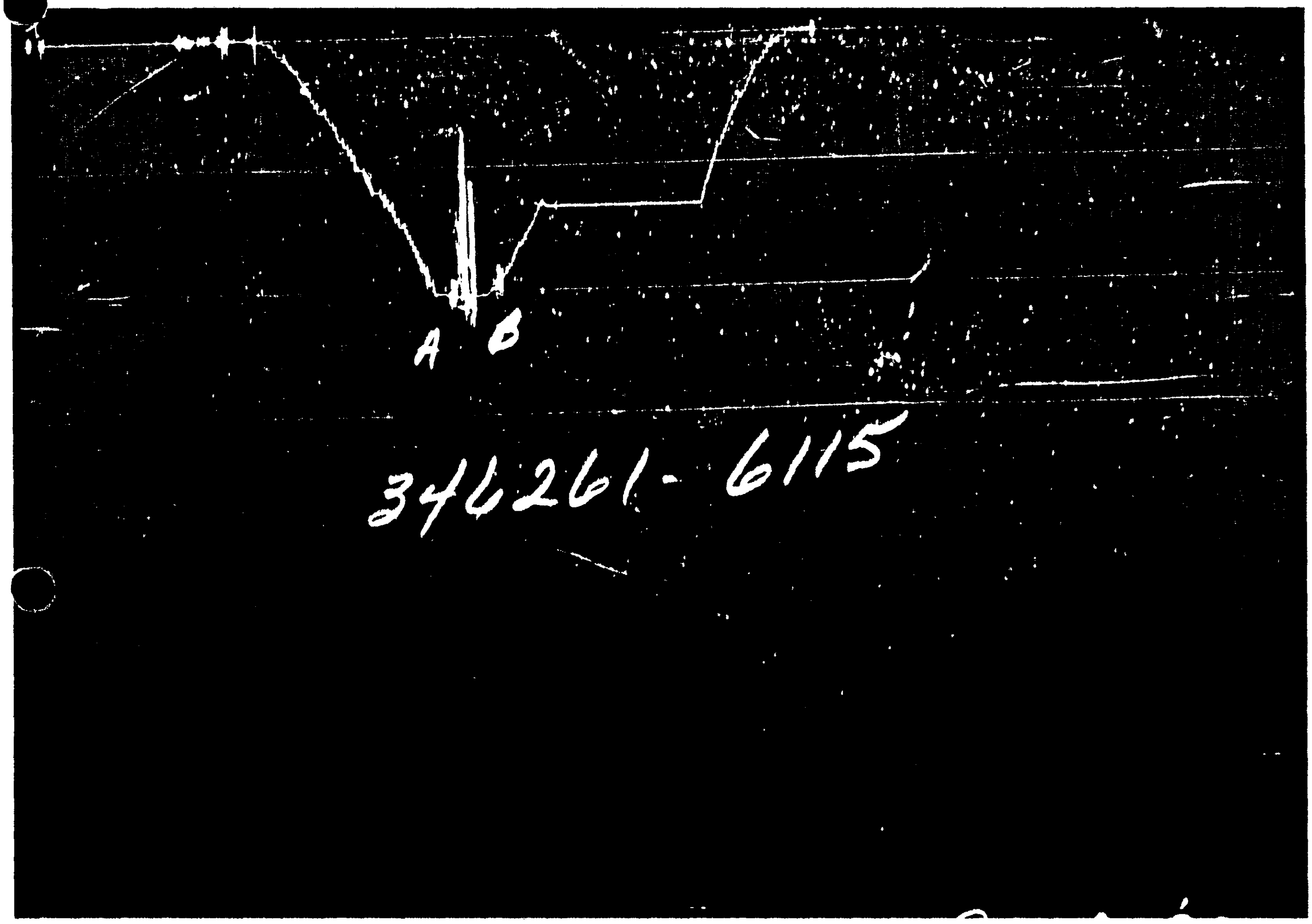
TICKET NO. 34626100

16-DEC-85

MOOMBA

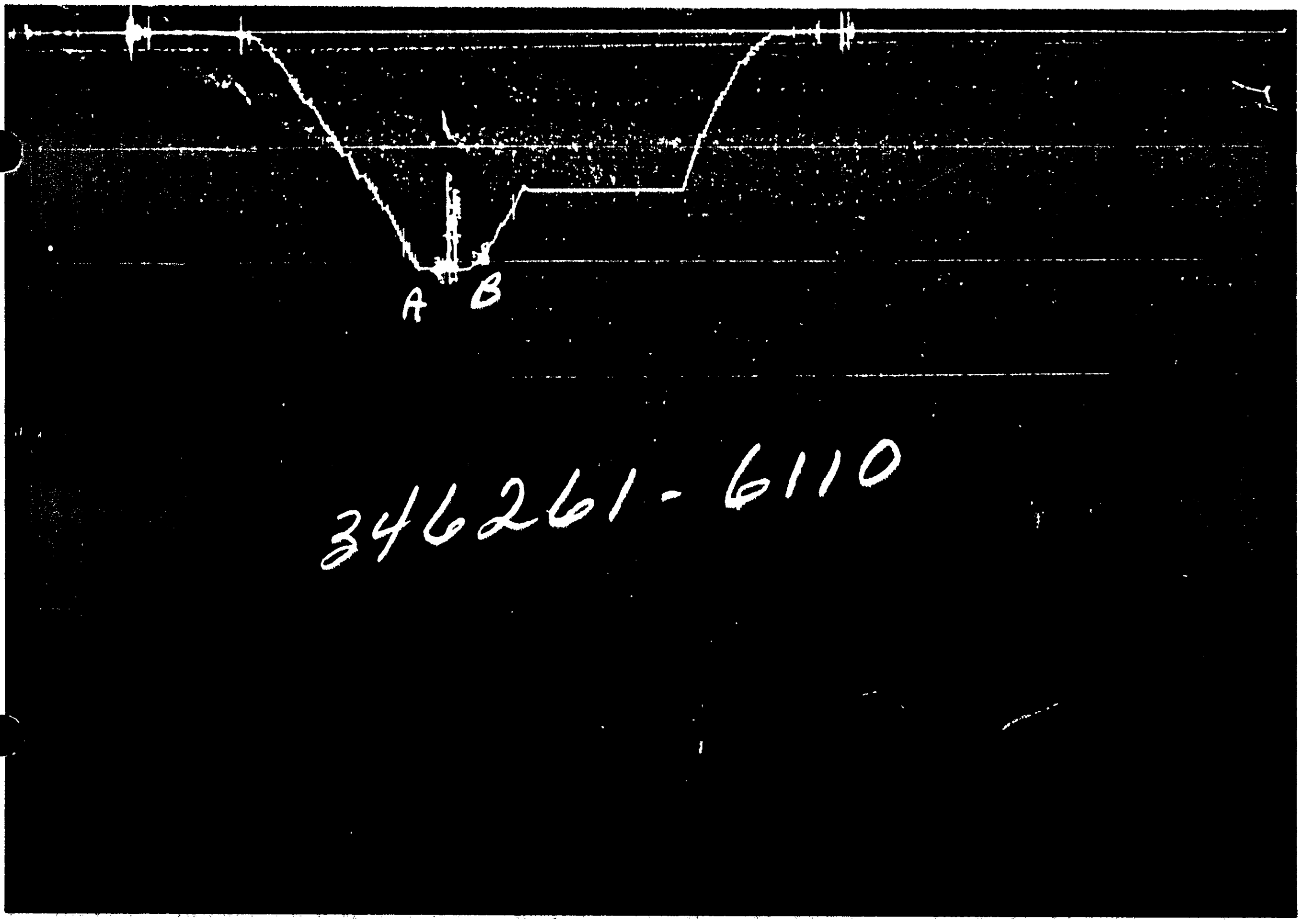
FORMATION TESTING SERVICE REPORT

LEASE NAME	FAHLEY
WELL NO.	1
TEST NO.	2
TESTED INTERVAL	4201.0 - 4253.0
LEASE OWNER/COMPANY NAME	BEACH PETROLEUM N.L.
LEGAL LOCATION SEC. - TWP. - RNG.	SEE REMARKS
FIELD AREA	OTWAY BASIN
COUNTY	VICTORIA
STATE	AUSTRALIA IC



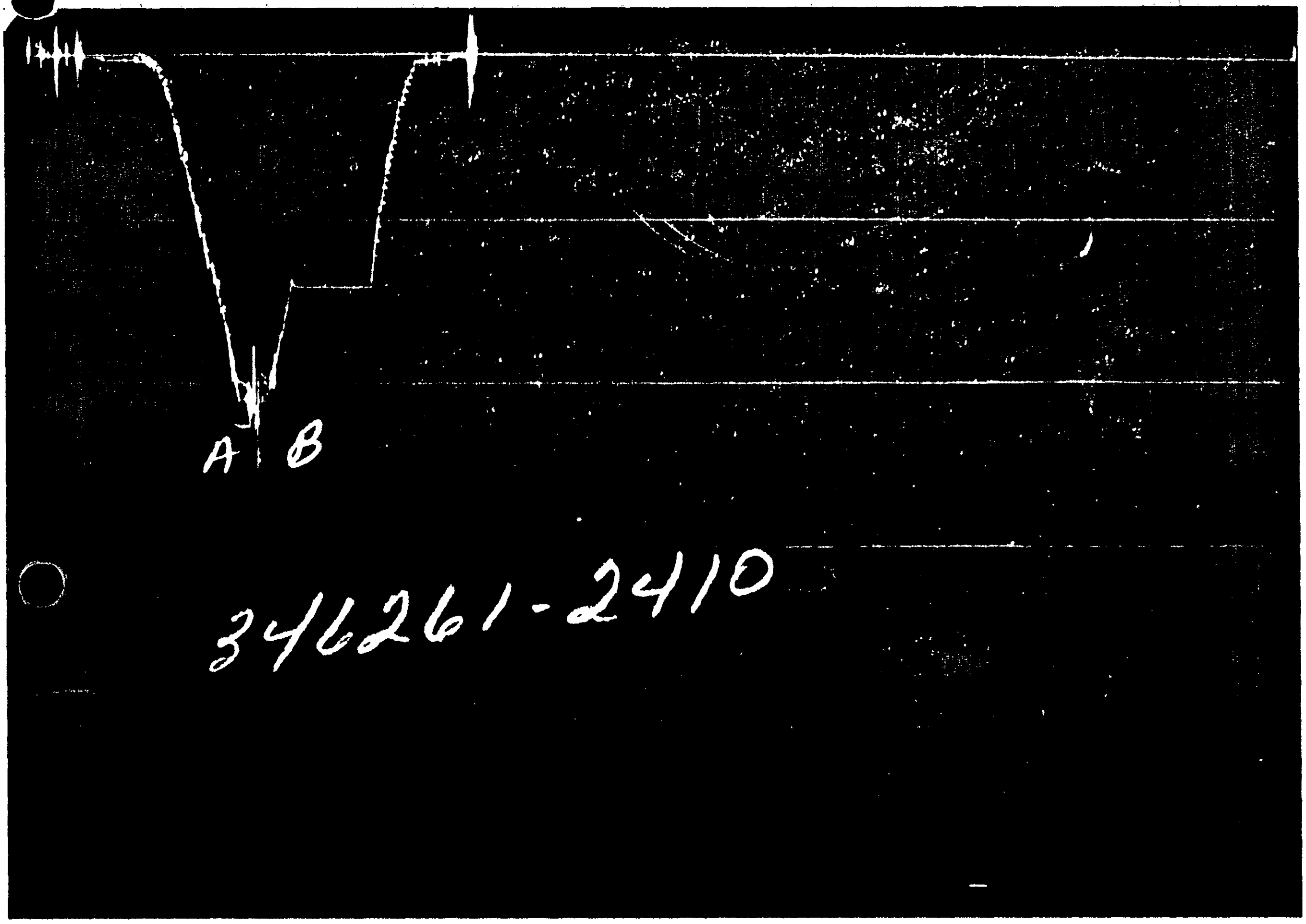
GAUGE NO: 6115 DEPTH: 4184.0 BLANKED OFF: NO HOUR OF CLOCK: 24

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC	2021	2060.6			
B	FINAL HYDROSTATIC	2025	2069.7			



GAUGE NO: 6110 DEPTH: 4229.0 BLANKED OFF: NO HOUR OF CLOCK: 24

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC	2121	2081.7			
B	FINAL HYDROSTATIC	2051	2089.3			



GAUGE NO: 2410 DEPTH: 4277.9 BLANKED OFF: YES HOUR OF CLOCK: 48

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC	2129	2124.5			
B	FINAL HYDROSTATIC	2129	2134.8			

EQUIPMENT & HOLE DATA

FORMATION TESTED: PEMBER
NET PAY (ft):
GROSS TESTED FOOTAGE: 52.0
ALL DEPTHS MEASURED FROM: KELLY BUSHING
CASING PERFS. (ft):
HOLE OR CASING SIZE (in): 8.500
ELEVATION (ft): 145.3
TOTAL DEPTH (ft): 4281.0
PACKER DEPTH(S) (ft): 4201, 4253'
FINAL SURFACE CHOKE (in):
BOTTOM HOLE CHOKE (in): 0.750
MUD WEIGHT (lb/gal): 9.40
MUD VISCOSITY (sec):
ESTIMATED HOLE TEMP. (°F):
ACTUAL HOLE TEMP. (°F): 130 @ 4276.9 ft

TICKET NUMBER: 34626100

DATE: 5-8-85 TEST NO: 2

TYPE DST: ON BTM. STRADDLE

HALLIBURTON CAMP: MOOMBA

TESTER: COLIN HUON

WITNESS: VINCE SANTOSTEFANO

DRILLING CONTRACTOR: P.D.S.A. RIG #2

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:

RAT HOLE MUD

MEASURED FROM TESTER VALVE

REMARKS:

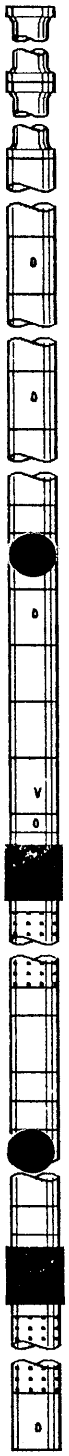
LEGAL LOCATION: LAT. 37 DEG., 57', 22.318"S; LONG. 141 DEG., 02', 48.152"E

TEST WAS CONDUCTED ON 8 MAY, 1985.

MISRUN - LOST PACKER SEAT.

TYPE & SIZE MEASURING DEVICE: 6" CERAMIC CHOKE					TICKET NO: 34626100
TIME	CHOKE SIZE	SURFACE PRESSURE PSI	GAS RATE MCF	LIQUID RATE BPD	REMARKS
5-8-85					
0238					MADE UP TOOLS
0520					TOOLS THROUGH ROTARY TABLE
0955					HEAD ON
1003					LINES RIGGED TO MANIFOLD AND
					FLOW LINE
1038					TAGGED BOTTOM
1049	.5	0			OPENED TOOL
1[illegible]					MODERATE TO STRONG BLOW-LOST PACKER
					SEAT
1051					PULLED FREE - PACKER UNSEATED
1052					TAGGED BOTTOM
1059					OPENED TOOL - LOST PACKER SEAT
1100					PULLED FREE
1645					TOOLS THROUGH ROTARY TABLE
1854					TOOLS LAYED OUT
					MISRUN - PACKER SEAT FAILED

TICKET NO. 34626100



		O.D.	I.D.	LENGTH	DEPTH
1	DRILL PIPE......................	4.750		3712.8	
4	FLEX WEIGHT.....................	4.500	2.500	182.2	
3	DRILL COLLARS...................	4.500	2.375	214.5	
51	PUMP OUT REVERSING SUB..........	6.000	3.000	1.0	4110.5
3	DRILL COLLARS...................	4.500	2.375	30.6	
50	IMPACT REVERSING SUB............	6.000	3.000	1.0	4140.9
3	DRILL COLLARS...................	4.500	2.375	30.0	
5	CROSSOVER.......................	5.000	2.250	1.0	
13	DUAL CIP SAMPLER................	5.000	0.870	4.9	
60	HYDROSPRING TESTER..............	5.000	0.750	5.0	4182.0
80	AP RUNNING CASE.................	5.000	2.250	4.1	4184.0
15	JAR.............................	5.000	1.750	5.0	
16	VR SAFETY JOINT.................	5.000	1.000	2.8	
17	PRESSURE EQUALIZING CROSSOVER...	5.000	2.500	1.0	
70	OPEN HOLE PACKER................	7.050	1.530	5.9	4200.9
20	FLUSH JOINT ANCHOR..............	5.000	2.370	24.0	
5	CROSSOVER.......................	5.000	2.500	1.0	
80	AP RUNNING CASE.................	5.000	2.250	4.1	4229.0
5	CROSSOVER.......................	5.000	2.500	0.7	
5	CROSSOVER.......................	6.000	3.000	0.9	
3	DRILL COLLARS...................	6.250	2.812	14.8	
5	CROSSOVER.......................	6.000	3.000	0.7	
70	OPEN HOLE PACKER................	7.050	1.530	5.9	4253.0
20	FLUSH JOINT ANCHOR..............	5.000	2.370	21.0	
81	BLANKED-OFF RUNNING CASE........	5.000		4.1	4277.9

TOTAL DEPTH 4281.0

EQUIPMENT DATA

APPENDIX 5

GLOBAL EVALUATION

Fahley Nº1
AT
BR

ATTN: MR. LANGTON
BEACH PETROLEUM
133 SERTELL RD
TEMPLESTOWE
VICTORIA 3106

DEAR SIR,

Please find enclosed the provisional processing on FAHLEY #1 over the interval 1474-1176. The model used was based on the Saraband model using the GLOBAL evaluation technique. This consists of SAND-SILT-CLAY . The RW value used was 0.15 at 71 deg. There doesn't appear to be any major indication of hydrocarbons. The zones where gas was detected during drilling at 1295 m is badly washed out and a reliable porosity indication is not possible. However in the porous zones of relatively clean sand (average 20 % clay) has a consistent resistivity profile and the value of RW was chosen in these zones.
The basic model is comparable with the processing on Lindon # 1.

If you have any questions concerning this processing please do not hesitate to contact me over the weekend at the office number Perth 322 1000.

Yours sincerely,

R.B. Holman

R.HOLMAN

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*                 *
*                 *
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*                 *
*  SCHLUMBERGER   *
*                 *
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"GLOBAL INTERPRETATION"

COMPANY   : BEACH PETROLEUM N.L.

WELL   : FA[illegible]LEY #1

FIELD   : WILDCAT

STATE   : VICTORIA

REFERENCE: FS1A.

COMPUTATION PARAMETERS

INTERVAL	RW	RMF	SWEQ	N	ROH	A	M	T
1473.9 TO 1176.1	.1500	.0400	2.000	2.000	.4000	1.000	2.000	71.00

COMPANY : BEACH PETROLEUM N.L. WELL : FARLEY #1

CLAY PARAMETERS

INTERVAL	RCL	RHOCL	PHINCL	DTCL	UCL	TCL	PCL	IPCL
1474.0 TO 1176.1	5.000	2.450	45.00	97.00	8.000	20.00	2.000	15.00

COMPANY : BEACH PETROLEUM N.L. WELL : FARLEY #1

SAND PARAMETERS

INTERVAL	RHOSAN	PHISAND	DTSAND	USAND	TSAND	PSAND	TPSAND
1474.0 TO 1176.1	2.650	-1.600	54.00	4.500	0	0	7.200

COMPANY : BEACH PETROLEUM N.L. WELL : FAHLEY #1

LIMESTONE PARAMETERS"

INTERVAL	RHOLIME	PHILIME	DTLIME	ULIME	TLIME	PLIME	TPLIME
1474.0 TO 1176.1	2.710	0	47.50	13.80	0	0	9.100

COMPANY : BEACH PETROLEUM N.L.   WELL : FAHLEY #1

DOLOMITE PARAMETERS"

INTERVAL	RHODOL	PHIDOL	DTDOL	UDOL	IDOL	PDOL	TPDOL
1474.0 TO 1176.1	2.870	2.470	43.50	9.000	0	0	8.700

"MINERAL ONE PARAMETER"

INTERVAL	RHO1	PHI1	DT1	UMIN1	THIN1	PMIN1	TPMIN1	KMIN1
1073.9 TO 1176.1	2.700	10.00	60.00	6.500				0

DEPTH	PHI	VCL	SXO	SW	RHG	VSND	VLIM	VDOL	VSH1	VSH2	VSH3	VSH4	CUMULATIVE POR/	HC/
M	%	%	%	%	G/C3	%	%	%	%	%	%	%	M	M
1460.0	26.7	7.6	97.	97.	2.70	39.3			26.4				3.20	.01
1450.0	21.7	22.6	100.	100.	2.76	35.5			20.3				3.96	.05
1440.0	25.7	19.7	100.	100.	2.74	54.6							6.07	.08
1430.0		90.0	98.	95.	3.04	3.5			6.5				7.89	.08
1420.0	25.9	20.3	100.	100.	2.74	51.4			2.5				9.69	.11
1410.0	24.8	13.6	100.	100.	2.72	52.0			9.5				11.91	.12
1400.0	20.8	19.1	100.	100.	2.74	52.6			7.6				14.21	.12
1390.0	.2	66.1	100.	100.	3.02	13.7							16.00	.13
1380.0	22.7	26.0	100.	100.	2.78	36.2			15.1				17.28	.15
1370.0	23.3	10.2	100.	100.	2.71	43.6			22.9				19.09	.21
1360.0	8.9	55.9	100.	100.	2.89	35.2							20.84	.24
1350.0	16.1	30.7	95.	76.	2.78	52.5			.6				22.77	.28
1340.0	23.8	12.5	100.	100.	2.72	46.0			17.7				24.95	.30
1330.0	12.1	51.6	100.	100.	2.87	36.3							27.19	.31
1320.0	7.0	56.6	100.	100.	2.90	17.8			16.6				28.34	.31
1310.0		67.5	100.	100.	2.92	32.5							29.17	.31
1300.0	.6	99.4	100.	100.	3.10								29.64	.31
1290.0		98.6	100.	100.	3.10				.3				30.24	.31
1280.0	1.6	98.5	100.	100.	3.10								30.36	.31
1270.0	.6	93.5	100.	100.	3.07				5.9				30.51	.31
1260.0	1.2	98.8	100.	100.	3.10								30.60	.31
1250.0	1.4	98.6	100.	100.	3.10								30.66	.31
1240.0	.7	98.8	100.	100.	3.10	.4							30.72	.32
1230.0	.8	99.2	100.	100.	3.10								30.78	.32
1220.0	1.3	98.7	100.	100.	3.10								30.90	.32
1210.0	20.5	16.2	100.	100.	2.74	34.5			28.9				32.07	.32
1200.0	25.6	26.0	100.	100.	2.78	38.1			10.2				33.69	.33
1190.0	17.0	39.6	100.	100.	2.83	31.1			12.2				35.92	.33
1180.0	2.1	97.9	100.	100.	3.10								37.19	.33

APPENDIX 6

SIDETRACKING

FAHLEY 1

LOSS OF DRILLING TOOLS DOWN HOLE

EVENTS LEADING UP TO THE LOSS OF THE DRILLING TOOLS

Fahley 1 was spudded at 0900 hours on 28/4/85. 13.3/8 inch surface casing was set at 87 m on 29/4/85 and 9.5/8 inch intermediate casing at 956 m on 3/5/85. Drilling operations continued normally down to 2029 m apart from a gradual increase in hole deviation to 7¼° at 1214 m which slowly dropped back to 3° at 1394 m. At 2029 m a deviation survey was dropped and the drilling assembly pulled out to change bits and recover the survey. The survey recorded a hole angle of 2½°. The drilling assembly was run back in the hole, and drilling operations resumed with regular deviation surveys.

At the depth of 2322 m, which was reached at 1700 hours on the 15/5/85, the deviation surveys showed that the hole angle had increased from 2° at 2125 m to 12° at 2319 m. It was considered desirable to plug back the hole and attempt to side-track rather than perservere with the deviation problem that had occurred.

Whilst it was possible to reduce the 12° deviation down to an acceptable level, the change in hole angle would have occurred through the Belfast Formation which we had entered at approximately 2293 m and which was expected to be 270 - 300 m thick. The Belfast Shale, when encountered in similar thickness, has created many drilling problems mainly due to the swelling nature of the shale. To reduce these shale swelling problems a KCL/Polymer mud system was being used, this being one of the most effective methods of controlling this type of shale. Notwithstanding the mud system being used it was considered extemely risky to attempt to reduce the 12° angle through the Belfast and then spend approximately 15 days drilling and evaluating the well.

The well was plugged back with a cement plug from 2220 - 2120 m. Unfortunately the cement plug was not hard enough to effect a kick off. A second cement plug was set over the interval 2251 m to 2131 m. A successful kick off was achieved at approximately 2180 m and controlled drilling operations ccntinued to 2433m.

At this depth a mechanical failure on the rig resulted in the drilling assembly becoming stuck. Fishing operations commenced immediately by jarring and working the pipe, however the jars failed to work effectively after 24 hours of fishing.

Schlumberger were rigged up to run their free point indicator tool to establish exactly where the assembly was stuck. The free point indicated that the drilling assembly was stuck just below the up jars.

A back off was attemped one joint of hevi-wate drill pipe above the up jars, and the drill string above this point successfully recovered at 0300 hours on 29/5/85.

At this stage, it was decided not to attempt any further recovery operations of the stuck assembly, as the attempts to date had been completely to no avail, and any chance of success was considered extremely remote. We were also concerned that the 7¼° deviation at 1214 m could lead to further problems during a fishing style operation resulting in further losses.

REDRILLING OPERATIONS

A cement plug was set across the interval 2220 m to 2070 m and dressed off to 2088 m. Hole problems while tripping required two wiper trips to stabilise the well. A dyna-dril assembly was run to bottom without problems and the hole sidetracked and deepened to a depth of 2156m.

The hole was circulated and conditioned prior to pulling out for intermediate logs. All three logging tools were successfully run with only minor problems being recorded.

The original depth of 2433 m was finally reached approximately 14½ days after the drilling assembly became stuck.

Drilling operations in the second sidetrack hole continued to a depth of 3211 m, with instability and tight hole problems becoming progressively more severe.

On the trip out from 3211 m, prior to a logging suite, the drillstring became stuck at 1344 m in a keyseat. Free movement was gained to rotate and go down, and backreaming proceeded to 1324 m where the string again became stuck. The pipe was again worked but unsuccessfully and no freedon was gained. The Schlumberger Stuckpoint Indicator Tool was run and the drillstring backed off above the stuck portion leaving the following tools in the hole: 1 joint hevi wate drill pipe, 18 x 6¼" drill collars, bit sub, 8½" bit. Subsequent attempts to fish the stuck portion (2.1 days) were unsuccessful, although the joint of hevi wate drill pipe was recovered.

The remaining 178 m of fish comprising the 18 drill collars, bit sub and bit, could not be tagged and it was determined that the hole should be plugged and abandoned.

APPENDIX 7

SOURCE ROCK STUDIES

FAHLEY NO. 1

K.K. No.	Depth (m)	$\bar{R}_v$max	Range	N	Exinite Fluorescence (Remarks)
					Pember Formation
x3000	1050 Ctgs	0.28	0.21-0.52	29	Sparse liptodetrinite, yellow to orange, rare cutinite, yellow orange, rare ?phytoplankton, yellow. (Sandstone>>siltstone>carbonate. Dom sparse, V>E>I. Vitrinite and exinite sparse, inertinite rare. Rare yellow fluorescing droplets of ?oil. Inorganic mud additive sparse. Iron oxides common. Carbonate rare. Framboidal pyrite abundant.)
	$\bar{R}_I$	0.79	0.59-0.89	5	
x3001	1150 Ctgs	0.29	0.21-0.36	28	Sparse phytoplankton, yellow, sparse liptodetrinite, yellow to orange. (Siltstone>>sandstone. Dom common, V>E>I. Vitrinite common, exinite sparse, inertinite rare. Inorganic mud additive rare. Iron oxides abundant. Carbonate sparse. Pyrite abundant.)
x3002	1250 Ctgs	0.32	0.27-0.41	26	Sparse phytoplankton, bright yellow to yellow, sparse liptodetrinite, yellow to orange, rare sporinite, yellow to orange. (Siltstone>>carbonate>sandstone. Dom common, V>E>I. Vitrinite common, exinite sparse to common, inertinite rare. Rare yellow fluorescing droplets of ?oil. Inorganic mud additive sparse. Iron oxides abundant. Pyrite abundant.)
					Paaratte Formation
x3003	1460 Ctgs	0.35	0.24-0.52	28	Sparse sporinite, yellow to orange, sparse liptodetrinite, bright yellow to orange, rare cutinite, yellow orange, rare phytoplankton, bright yellow to yellow. (Sandstone>siltstone>carbonate>coal. Coal rare, vitrite. Dom common, I>V>E. Inertinite common, vitrinite sparse to common, exinite sparse. Iron oxides common. Inorganic mud additive rare. Pyrite abundant.)
x3004	1690 Ctgs	0.37	0.27-0.50	29	Sparse liptodetrinite, yellow to orange, rare sporinite, yellow, rare phytoplankton, bright yellow to yellow. (Sandstone>siltstone>carbonate>coal. Coal rare, vitrite=inertite. Dom common, I>V>E. Inertinite sparse to common, vitrinite and exinite sparse. Green fluorescing ?oil droplets present especially in the mounting resin. Inorganic mud additive sparse. Iron oxides sparse. Pyrite common.)
x3005	1940 Ctgs	0.40	0.35-0.53	16	Rare liptodetrinite and cutinite, yellow to dull orange, rare resinite, yellow. (Sandstone>siltstone>claystone>carbonate>coal. Coal sparse, V. Vitrite. Dom sparse, I>E>V. Inertinite sparse, exinite and vitrinite rare. Green to yellow fluorescing ?oil droplets present. Inorganic mud additive present. Pyrite abundant.)
	$\bar{R}_I$	1.12	0.62-1.77	13	

FAHLEY NO. 1

K.K. No.	Depth (m)	$\bar{R}_v$max	Range	N	Exinite Fluorescence (Remarks)
x3006	2030 Ctgs	0.37	0.25-0.51	22	Rare phytoplankton, bright yellow to yellow, rare liptodetrinite, yellow to orange. (Sandstone>>siltstone>>carbonate>coal. Coal rare, vitrite, probably cavings. Dom sparse, I>V>E. Inertinite and vitrinite sparse, exinite rare. Iron oxides common. Inorganic mud additive rare. Green fluorescing ?oil droplets rare. Cavings may form a significant part of the vitrinite population. Pyrite common.)
x3007	2310 Ctgs *Presumed cavings	0.58*	0.47-0.76	17	Sparse liptodetrinite, yellow orange, rare phytoplankton, yellow. (Sandstone>siltstone>carbonate>shaly coal. Shaly coal rare, inertite. Dom common, I>V>E. All three maceral groups sparse. Iron oxides common. Inorganic mud additive sparse. Green fluorescing ?oil droplets present, mainly in setting resin. Pyrite common.)
					Belfast Mudstone
x3008	2400 Ctgs	0.60	0.41-0.75	25	Sparse sporinite and liptodetrinite, yellow to orange, sparse phytoplankton, bright yellow to yellow, rare cutinite, yellow to orange, rare resinite, yellow, rare ?fluorinite, green. (Siltstone>sandstone>carbonate>coal. Coal rare, vitrite. Dom abundant, I>E>V. Inertinite and exinite common, vitrinite sparse to common. Diffuse humic matter rare. Iron oxides sparse. Green fluorescing ?oil droplets present. Pyrite abundant.)
x3009	2520 Ctgs	0.58	0.46-0.71	12	Rare sporinite, yellow, rare phytoplankton and liptodetrinite, bright yellow to yellow. (Sandstone>>siltstone>carbonate. Dom common, I>V>or=E. Inertinite common, vitrinite and exinite rare. Inorganic mud additive sparse. Iron oxides common. Pyrite abundant.)
	$\bar{R}_I$	1.00	0.85-1.21	5	
x3010	2620 Ctgs	0.60	0.47-0.76	32	Rare resinite and sporinite, yellow, rare phytoplankton, bright yellow to yellow, rare liptodetrinite, yellow to orange. (Sandstone>>siltstone>>carbonate>coal. Coal rare, pyritized vitrite. Dom common, I>V>E. Inertinite common, vitrinite and exinite sparse. Iron oxides rare. Inorganic mud additive rare. Green fluorescing ?oil droplets present. Diffuse humic matter rare. Pyrite common.)
x3011	2690 Ctgs	0.66	0.48-0.81	29	Sparse phytoplankton, bright yellow to yellow, sparse liptodetrinite, bright yellow to orange, rare resinite, yellow, rare sporinite, yellow to orange, rare cutinite, orange to dull orange. (Sandstone>>siltstone>carbonate>shaly coal. Shaly coal rare, vitrite. Dom common, V>I>or-E. All three maceral groups sparse. Inorganic mud additive rare. Green fluorescing oil droplets present. Moderate green oil cut from cracks in ?carbonate/additive. Pyrite common.)

FAHLEY NO. 1

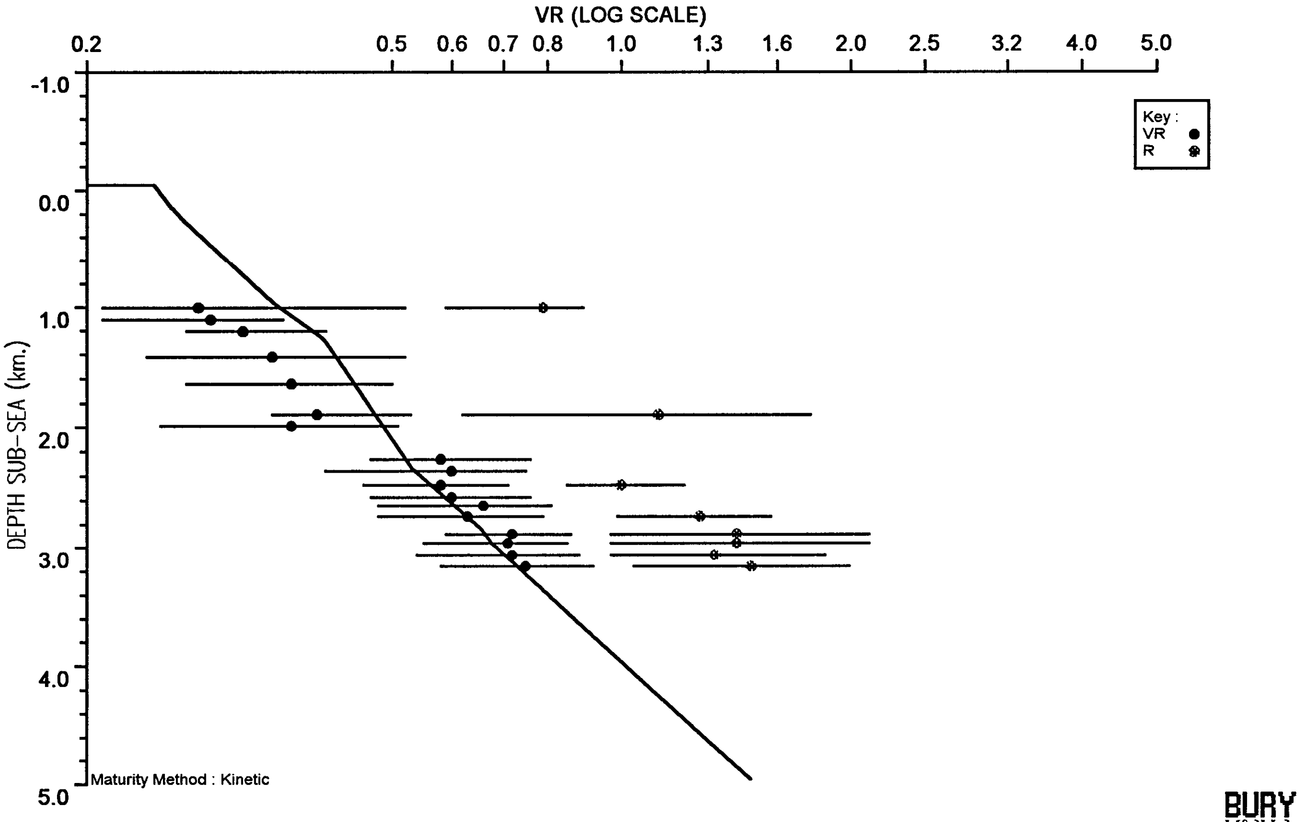
K.K. No.	Depth (m)	$\bar{R}_v$max	Range	N	Exinite Fluorescence (Remarks)
x3012	2780 Ctgs	0.63	0.48-0.79	29	Sparse liptodetrinite and cutinite, yellow orange to dull orange, rare phytoplankton, yellow, rare sporinite, yellow orange, rare resinite, yellow, rare ?bituminite, dull orange to brown. (Sandstone>siltstone>carbonate>claystone>shaly coal. Shaly coal common, inertite. Dom common, I>or=V>E. Inertinite and vitrinite common, exinite sparse. Vitrinite shows weak dull brown fluorescence. Green ?oil in fissures of carbonate. Mud additive present. Pyrite abundant.)
	$\bar{R}_I$	1.27	0.99-1.57	6	
					Waarre Sandstone
x3013	2930 Ctgs	0.72	0.59-0.86	25	Sparse liptodetrinite and sporinite, yellow orange to dull orange, rare cutinite, yellow to dull orange, rare resinite/fluorinite, greenish yellow to yellow, rare phytoplankton, greenish yellow, rare ?bituminite, dull orange to brown. (Sandstone>siltstone>carbonatecarbonaceous siltstone. Dom abundant, in some siltstone grains common overall. I>V>E. Inertinite common, vitrinite sparse, exinite locally abundant but sparse overall. Some vitrinite shows weak dull brown fluorescence. Green oil cut from some siltstone grains. Strong mineral fluorescence. Pyrite abundant.)
	$\bar{R}_I$	1.38	1.11-1.76	6	
x3014	3010 Ctgs	0.71	0.55-0.85	25	Sparse liptodetrinite and sporinite, yellow to dull orange, rare cutinite, yellow to dull orange, rare ?phytoplankton, greenish yellow. (Siltstone>sandstone>carbonate>shaly coal. Shaly coal rare, vitrite. Dom common, I>V>E. Inertinite common, vitrinite and exinite sparse. Most vitrinite shows weak brown fluorescence. Green oil cut from some siltstone grains. ?Oil present in sandstone. Strong mineral fluorescence. Pyrite abundant.)
	$\bar{R}_I$	1.42	0.97-2.11	5	
x3015	3110 Ctgs	0.72	0.54-0.88	31	Sparse liptodetrinite, yellow to dull orange, rare sporinite and cutinite, yellow orange to dull orange, rare resinite, yellow. (Siltstone>sandstone>claystone>carbonate>shaly coal. Shaly coal rare, V>>E>I. Clarite. Dom common, I>V>E. Inertinite common, vitrinite and exinite sparse. Vitrinite shows weak dull brown to brown fluorecence. Rare green oil cut from some siltstone and claystone grains and occasionally from vitrinite. Strong mineral fluorescence. Pyrite abundant.)
	$\bar{R}_I$	1.33	0.97-1.85	5	

FAHLEY NO. 1

K.K. No.	Depth (m)	$\bar{R}_v max$	Range	N	Exinite Fluorescence (Remarks)
x3016	3200 Ctgs	0.75	0.58-0.92	32	Common cutinite and sporinite, yellow orange to dull orange, sparse liptodetrinite, yellow to dull orange, sparse resinite, yellow, rare bituminite, dull orange, rare suberinite, dull yellow to dull orange, rare ?telalginite, yellow, rare fluorinite, greenish yellow. (Siltstone>sandstone>carbonaceous siltstone>carbonate>shaly coal. Shaly coal rare, I>V. Vitrinertite(I)=inertite. Dom abundant, I>V>or=E. Inertinite abundant, vitrinite and exinite common. Vitrinite shows dull orange to brown fluorescence. Weak green oil cut from some vitrinite. Greenish yellow fluorescing oil droplets present. Strong mineral fluorescence. Pyrite abundant.)
	$\bar{R}_I$	1.48	1.04-1.99	5	

FAHLEY NO. 1

KK No.	Depth (m)	TOC
x3000	1050	0.47
x3001	1150	1.57
x3002	1250	1.13
x3003	1460	1.46
x3004	1690	1.14
x3005	1940	0.40
x3006	2030	0.44
x3007	2310	1.08
x3008	2400	1.65
x3009	2520	0.73
x3010	2620	1.02
x3011	2690	1.18
x3012	2780	0.71
x3013	2930	0.96
x3014	3010	0.69
x3015	3110	0.86
x3016	3200	1.54



OBSERVED vs COMPUTED MATURITY PLOT : fahley1

APPENDIX 8

PETROGRAPHY & X-RAY DIFFRACTION ANALYSIS

The Australian
[..]eral Development
Laboratories

Flemington Street, Frewville,
South Australia 5063
Phone Adelaide (08) 79 1662
Telex AA82520

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

amdel

11 September 1985

F 3/944/0
F 6292 Part 1

Beach Petroleum N.L.
PO Box 360
CAMBERWELL VIC 3124

Attention: Dr A. Iabassi

REPORT F 6292 - Part 1

YOUR REFERENCE: Letter of 19 August 1985

MATERIAL: Cuttings

LOCALITY: Fahley-1

WORK REQUIRED: Petrography and X-ray diffraction analysis

Investigation and Report by: Dr Brian G. Steveson
Dr Roger Brown (XRD)

Chief-Petroleum Services Section: Dr Brian G. Steveson

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cap

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1. PETROGRAPHY

INTRODUCTION

Fourteen samples of washed cuttings from Fahley-1 were received for examination by petrographic methods. In the absence of log results, information on porosity characteristics was particularly required. In general, the cuttings fragments can be classified into a few types and, instead of providing full descriptions (which would be of limited value for the purpose of this study) an estimate is given of each fragment type and special characteristics noted for that fragment type in each sample.

Type 1

Quartz crystals. These are single quartz crystals which comprise the whole of a cuttings fragment. They were presumably originally grains in a sandstone; hence sorting and roundness characteristics are indicative of detrital grain features.

Type 2

Sandstones. These are polygranular fragments. The nature of sorting, diagenesis, matrix, etc. can be seen and hence these are the most useful grains in assessing the factors which have affected porosity development.

Type 3

Shales etc. These are fine-grained, dark brown grains which can generally be referred to as shaley, silty sedimentary rocks. All such grains have a signficant component of indeterminate sub-microscopic material and are essentially impervious and impermeable.

Type 4

Miscellaneous other grains.

Six figures (photomicrographs) showing typical features are included.

Sample 1300 m (TSC45770)

Quartz crystals (50%). Moderately to poorly sorted; mean size about 0.3 mm. Most are angular though a few (broken?) grains show rounded vertices.

Sandstones (2%). Vary. Some fine-grained sandstone with abundant dolomite cement completely filling intergranular spaces. Rare coarser quartz with peripheral dolomite crystals attached.

Shales etc., (47%). Mostly very dark to opaque ferruginous shales. Some are ?concretionary.

Miscellaneous (1%). Traces of carbonaceous ?microfossils.

Sample 1340 m (TSC45771)

Quartz crystals (95%). Moderately well-sorted sub-angular to rounded grains with an average size of about 0.3 mm. Rare fresh K-feldspar and chert also. The abundance of this material suggest that the rock was a clean arenite.

Shales etc., (5%). Opaque to pale brown lithologies comprising shales and sandy shales/mudstones.

Since there is no evidence of diagenetic phases, quartz overgrowths etc., it seems likely that the Timboon Sand Member in this well is a clean, porous sandstone.

Sample 1650 m (TSC45772)

Quartz crystals (30%). Angular, poorly-sorted grains ranging in size from 0.1 to 0.3 mm (rarely up to 0.8 mm).

Sandstones (55%). The grain size of the quartz grains varies from fragment to fragment, from about 0.1 to 0.25 mm but individual fragments contain well-sorted grains. Labile detrital phases are absent. All sandstone fragments show all of the intergranular space completely filled with authigenic dolomite. There is no visible porosity and dolomite commonly comprises 20-40% of each sandstone grain. Irregular contacts between quartz and dolomite indicate that the dolomite has replaced some of the quartz.

Shales etc., (15%). Black sandy and silty argillaceous rocks. Some have been extensively replaced by micritic, dark carbonate (probably dolomite).

Miscellaneous (1%). A few large crystals of calcite, concretionary fragments (of ferruginous material) and multi-chambered fossil remains.

Sample 1860 m (TSC45773)

Quartz crystals (50%). Commonly 0.2-0.6 mm in size, ill-sorted crystals. Some show rounding but most are distinctly angular.

Sandstones (30%). The sandstone lithologies vary widely both in terms of the average grain size (all are well-sorted) and the nature of the cement; however, all are tight, compact rocks with no visible porosity. Common types are:

Argillaceous, fine-grained sandstones with squeezed lithic fragments.
Fine-grained sandstones, as above, but with up to 5% authigenic kaolinite.
Varied medium and fine-grained sandstones with either dolomitic (poikilitic) cement or an abundant cement of opaques (?pyrite). A few grains show both opaque and dolomite cement.

Shales, etc., (20%). Very varied lithologies ranging from opaques with isolated sand and silt-grade quartz grains to genuine ferruginous shales. Some grains have been replaced by micritic carbonate.

Sample 2050 m (TSC45774)

Quartz crystals (90%). Generally 0.15 to 0.4 mm in size and not well-sorted. Possibly 10-25% of the grains show some rounding.

Sandstones (<5%). Some relatively coarse-grained sandstones are mature arenites with 10-25% of a dolomite cement. More common sandstones are fine-grained and contain labile argillaceous lithic clasts (as well as quartz). These fine-grained sandstones also contain both dolomite and kaolinite as authigenic phases, the former as small, well-formed crystals, the latter in random, monomineralic mosaics.

Shales, etc., (5%). Dark argillaceous and dolomitic rocks obscurred by ferruginous material.

Miscellaneous (1%). A few large glauconite (?) fragments, nodular clayey rocks and a brown/green isotropic fragment.

Sample 2210 m (TSC45775)

Quartz crystals (55%). These are poorly to moderately sorted and most are angular in shape. A few have some rounded vertices and there are rare instances of thin quartz overgrowths.

Sandstones (30%). The most common sandstone type is a bimineralic lithology consisting of well-sorted equant but angular quartz grains in a partly poikilitic mosaic of authigenic dolomite. The latter commonly comprises more than 25% of the sandstone. The average grain size varies from grain to grain from obout 0.1 mm to as much as 0.25 mm. Other sandstones have an opaque matrix and there are one or two showing more complex textures in which argillaceous lithic fragments have been compressed between the quartz grains and there are phases of dolomite and opaques.

Shales etc., (15%). Dark brown to orange-coloured fragments of silty and sandy shale.

Sample 2365 m (TSC45776)

Quartz crystals (1%). Rare crystals up to 0.9 mm in size. All are angular and since the sizes range down to about 0.15 mm the sorting is poor.

Sandstones (90%). Most of the sandstones are well-sorted rocks with an average grain size of about 0.1 to 0.15 mm. The great majority of the sandstone fragments contain of the order of 25-35% of authigenic dolomite and this completely fills intergranular spaces. A few of the sandstone fragments have a clay matrix as well as correspondingly small amounts of dolomite. Some of the clay material may well be drilling mud which has invaded the cuttings. None of the sandstones show any visible porosity.

Shales etc., (7%). Most of these are silty shales and mudstones which contain up to about 25% of widely distributed angular quartz fragments. These occur in a matrix of black to pale brown clays with some foliation shown by lenses of even darker material.

Sample 2505 m (TSC45777)

Quartz crystals (30%). Many of the quartz crystals are more than 0.4 mm in size and generally show some angular and some rounded corners. There is a range of grains down to approximately 0.2 mm and hence the material is not well-sorted. Some of the larger fragments in this category are in fact quartzite fragments presumably derived from a rather coarse-grained sandstone.

Sandstones (60%). Most of the sandstones are cemented with well-crystallised dolomite showing a tendency towards poikilitic textures. Other sandstones have a very pale brown clay matrix much of which appears to be kaolinite and is at least partly of authigenic origin. Both the kaolinite and the dolomite completely fill pore spaces and the samples are probably impervious and impermeable. The average crystal size of the sandstone varies from fragment to fragment typically from about 0.1 mm in some case to somewhat less well-sorted rocks in which the average grain size is about 0.25 mm. The sandstones contain some lithic argillaceous fragments but, typically, detrital feldspar, mica and heavy minerals are absent.

Shales etc., (10%). These are dark brown to orange-coloured fragments of fine-grained argillaceous material which generally contains at least a small proportion of fine-grained terrigenous quartz. Such fragments are, also, impervious.

Sample 2635 m (TSC45778)

Quartz crystals (70%). The crystals are distinctly poorly-sorted and generally range in size from 0.15 mm to 0.7 mm with a small proportion of even larger fragments. Some of the medium sized quartz fragments show fairly good rounding and, since many of the fragments have some rounded vertices it seems likely that these are broken fragments which were originally well rounded. There are a few quartzite fragments but no feldspar crystals.

Sandstones (15%). Sandstone fragments are very varied and include most of the types described above. Typical are fragments which contain only a few quartz grains and well-crystallised intergranular dolomite. These sandstones commonly have an average grain size of at least 0.2 mm. Finer grained sandstone fragments are probably somewhat more abundant and tend to have more heterogeneous textures and a greater component of fine-grained clay. Most of this is probably derived from original argillaceous lithic fragments. The compaction of these and the precipitation of small amounts of authigenic kaolinite renders these fine-grained sandstones as impervious and impermeable as the 'cleaner' dolomitic sandstones.

Shales etc., (15%). As in other samples in this collection, the shales are invariably rather dark and iron-stained lithologies which, as well as abundant submicroscopic clay, contain small amounts of silt-grade and fine sand-grade quartz debris.

Sample 2795 m (TSC45779)

Quartz crystals (20%). These appear to be fairly well-sorted and generally range in size from 0.15 to about 0.4 mm. The fragments are equant but most are distinctly angular in shape. There are one or two fragments which appear to be broken remnants of larger and more rounded grains.

Sandstones (70%). In general, the sandstones in this sample belong to one of two types. The more abundant is a fine-grained sandstone with an average grain size of not more than about 0.07 mm. This is well-sorted but is principally characterised by the abundance of clay material much of which appears to be of original lithic origin. Also present are detrital micas and heavy minerals. As a result of compaction this sandstone is completely tight and impervious. The other major type of sandstone is distinctly coarser grained and tends to be bimineralic since the quartz grains have been cemented entirely by coarse-grained poikilitic dolomite. Some of these sandstones have some secondary opaque material. The average crystal size of these sandstones in different fragments, ranges from 0.06 mm to about 0.2 mm. One or two other sandstone fragments have a rather abundant brown clay matrix but there are only one or two examples of this type in the thin section.

Shales etc., (10%). These are dark brown to opaque grains which generally consist mostly of fine-grained clays with small amounts of sand and silt detrital material. Some of these fragments may contain extremely fine-grained carbonate.

Miscellaneous (1%). There are one or two fragments of coarse-grained calcite and some rather pale clay-rich grains somewhat different from the typical shales from this well.

Sample 2895 m (TSC45780)

Quartz crystals (15%). These are equant angular fragments up to 0.7 mm in size and, consequently, apparently ill-sorted.

Sandstones (75%). The sandstones are distinctly varied in this sample and commonly include varieties of fine-grained sandstones with an abundant argillaceous lithic component and coarser grained sandstones in which the detrital quartz occurs only with authigenic dolomite. These two types of sandstones are similar to many others described in this well. The rock also contains a few examples of opaque-cemented sandstone and one or two of these show the opaques concentrated in numerous microstylolitic zones. Present in significant amounts, however, are fine-grained sandstones which have a rather dark colour and clearly a high clay content. These sandstones are completely tight and impervious as a result of the abundance of this clay. While most of these lithologies have an average grain size near the border between silt and sandstone others are somewhat coarser and contain grains having an average grain size of about 0.1 mm. Despite the heterogeneity of the sandstones in this sample, it is clear that due to compaction effects on the finer grained and less mature sandstones and as a result of the deposition of abundant authigenic dolomite in the pores of the coarser sandstones all of the lithologies are impervious.

Shales etc., (7%). The shales are similar to those in samples described above with possibly a somewhat greater proportion of paler lithologies containing more obviously broken and shattered detrital material in an abundant clay matrix.

Miscellaneous (1%). The thin section contains several grains of a green clay mineral which is probably glauconite.

Sample 3120 m (TSC45781)

Quartz crystals (15%). Many of the quartz crystals have small peripheral attachments of clay or, in a few instances calcite. This is a clear indication that they were originally derived from sandstone. Most of the crystals range in size from 0.15 mm to about 0.4 mm and many show at least some rounded vertices.

Sandstones (60%). The sandstones vary very widely, particularly in that some contain authigenic carbonate, some authigenic kaolinite and lithic fragments and a few sandstone fragments also have a very tight structure with a great deal of secondary quartz overgrowths. As a result of the presence of these various diagenetic features, all of the sandstone fragments appear to be distinctly tight. The detrital grains are generally well-sorted but the average grain size varies considerably from fragment to fragment. Most of the sandstones are relatively 'clean' with fairly abundant dolomite and calcite cement. Somewhat finer grained sandstones often have a small amount of argillaceous lithic material and these show evidence of compaction. It is also these finer grained sandstones which tend to have authigenic kaolinite filling the pores.

Shales etc., (25%). The cuttings contain several large shale fragments which are dark both between crossed Nicols and in plane polarised light. Many of these darker fragments contain a small to moderate proportion of terrigenous silty or fine sand material and in some instances there is almost a population of gradational fragments between fine-grained argillaceous sandstones and silty and sandy shales.

Miscellaneous (1%). The cuttings contain a few fragments which consist of single crystals of calcite. It is possible that this represents authigenic calcite in coarse-grained sandstones and this seems more likely than that the calcite is derived from limestones (for which there is no other evidence).

Sample 3140 m (TSC45782)

Quartz crystals (60%). The quartz crystals are commonly more than 0.4 mm in size and many are as much as 0.6 to 0.8 mm in overall diameter. The crystals are equant and most show some rounded vertices. There are rare instances of extremely well-rounded fragments.

Sandstones (20%). There is a wide range of sandstone types in these cuttings but virtually all of the fragments are well-sorted and impervious. The average grain size ranges from about 0.1 mm to as much as about 0.5 mm. Some of the fragments contain quartz overgrowths and are virtually monomineralic whereas others have significant amounts of authigenic phases which have filled any pore space remaining after compaction of the sandstone. In separate fragments, the authigenic phases may be dolomite, kaolinite or calcite. Most of the sandstones are fairly clean and do not contain a large amount of detrital clay material.

Shales etc., (20%). These are dark, rather heterogenous fragments ranging from wholely opaque types to more heterogenous fragments which contain a large amount of iron-stained clay material with significant quantities of rather fine-grained terrigenous quartz and clay clasts.

Miscellaneous (1%). A small proportion of coarse-grained calcite fragments is present.

Sample 3205 m (TSC45783)

Quartz crystals (30%). The quartz crystals are poorly-sorted in the cutting and most are distinctly angular in shape. Many of the crystals have small amounts of clay or carbonates attached which indicates their origin probably from original sandstones. The largest quartz crystal in the sample is about 1.5 mm in size.

Sandstones (45%). Most of the sandstones are well-sorted and have an average grain size of approximately 0.1 to 0.15 mm. All are completely tight and this is a result principally of the development of diagenetic mineral phases in the original interstices. In some sandstone fragments the intergranular material is carbonate (both calcite and dolomite) but in most cases the sandstone fragments contain what is clearly authigenic kaolinite. Many of the sandstones show the development of quartz overgrowths and extremely tight granular textures.

Shales etc., (25%). The shales have a varied texture and mineralogy but most are characterised by abundant opaque and semi-opaque ferruginous material which probably obscures original clays. Most of the fragments contain at least a small component sand-grade and silt-grade detrital quartz.

2. CLAY MINERAL ANALYSIS

2.1 Procedure

The samples were air-dried at room temperature. Portion of each was powdered finely and used to prepare an X-ray diffractometer trace which was interpreted by standard procedures.

Further, weighed subsamples were taken and dispersed in water with the aid of deflocculants and an electric blender, and allowed to sediment to produce −2 µm e.s.d. size fractions by the pipette method. The resulting dispersions were examined by plummet balance to determine their solids contents, and were then used to produce oriented clay preparations on ceramic plates. Two plates were prepared per sample, both being saturated with Mg^{++} ions, and one in addition being treated with glycerol. When air-dry, these were examined in the X-ray diffractometer. Various additional diagnostic examinations were carried out as required, including examination of the glycerol-free plate hot (≈130°C) and after heating for one hour at 550°C.

2.2 Results

The results are given in Table 1, which lists the following:

(a) The mineralogy of the total sample, as derived from examination of the bulk material, with supporting evidence as available. The minerals found are listed in approximate order of decreasing abundance, using the semiquantitative abbreviations given. Coverage of clays may be incomplete, and for full clay mineralogy Section (c) should be consulted. This section (a) is for information on non-clay minerals and to give a general idea of the makeup and proportions.

(b) The proportion of the sample found to separate into the −2 µm size fraction, as determined by the plummet balance. The figure obtained applies only to the pre-treatment and dispersion conditions used.

(c) The mineralogy of the −2 µm fraction, given as in Section (a).

2.3 Remarks

The only significant trends with depth down the hole appear to be the onset of the occurences of chlorite (at 2400 m) and mixed-layer smectite-illite (at 2030 m). Other possible observations based on reported relative proportions of clay minerals are not based on accurate enough measurements to be signficant.

TABLE 1: MINERALOGY OF CLAY FRACTIONS OF 10 BOREHOLE SAMPLES

Sample	1250 m		1460 m		2030 m		2400 m		2620 m	
-2µm fraction %:	K	D	K	D	K	D	K	D	K	D
Mineralogy:	M	SD	M	A-SD	ML	SD	ML	A-SD	ML	A-SD
	Q	Tr-A	Q	Tr-A	M	A	M	A	M	A
					Q	A	C	A	C	A
							Q	Tr-A	Q	A

Sample	2750 m		2850 m		2940 m		3050 m		3200 m	
-2 µm fraction %:	K	D	K	D	K	D	K	D	K	D
Mineralogy:	M	A-SD	M	A-SD	ML	A-SD	ML	SD	M	A-SD
	Q	A	ML	A	M	A-SD	C	A	ML	A
	C	A	C?	A	C	A	M	A	C	A
			Q	Tr	Q	A	Q	A	Q	Tr

MINERAL KEY

C	Chlorite
K	Kaolinite
M	Mica/Illite
ML	Randomly interstratified mixed-layer smectite-illite
Q	Quartz

SEMIQUANTITATIVE ABBREVIATIONS

D = Dominant. Used for the component apparently most abundant, regardless of its probable percentage level.

SD = Sub-dominant. The next most abundant component(s) providing its percentage level is judged above about 20.

A = Accessory. Components judged to be present between the levels of roughly 5 and 20%.

Tr = Trace. Components judged to be below about 5%.

Figure Captions

All figures are photomicrographs taken in plane polarised light. The longer axis represents approximately 2 mm.

Figure 1, 1860 m. Sandstone fragment with opaque and dolomite cement.

Figure 2, 2050 m. Clean sandstone, subangular, well-sorted quartz grains (white). Sandstone fragment is dolomite (d) cemented.

Figure 3, 2505 m. Typical dolomite (d) cemented sandstone. All the dolomite in the fragment is one poikilitic crystal. The sandstone is well-sorted.

Figure 4, 2795 m. The brown intergranular phase is clay. Note the angularity but good sorting of the grains of quartz.

Figure 5, 3120 m. Kaolinite (k) fills virtually every intergranular space in this sandstone. There was an early diagenetic phase of clay deposition on grain surfaces, followed by the abundant kaolinite.

Figure 6, 3205 m. Detrital grain shapes are marked by dark clay rims - beyond these are large areas of overgrowths (o). Also shown are patches of brown clay matrix (c) and a grain of tourmaline (t).

PE905756

This is an enclosure indicator page.
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The enclosure PE905756 has the following characteristics:

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CONTAINER_BARCODE = PE902402
NAME = Thinsection Core Photos for Fahley-1(figures 1&2)
BASIN = OTWAY BASIN
PERMIT = PEP/105
TYPE = WELL
SUBTYPE = PHOTOMICROGRAPH
DESCRIPTION = Core Photos (figures 1&2 from appendix 8 --petrography and x-ray diffraction analysis--of WCR) for Fahley-1
REMARKS =
DATE_CREATED =
DATE_RECEIVED = 17/02/86
W_NO = W905
WELL_NAME = FAHLEY-1
CONTRACTOR =
CLIENT_OP_CO = BEACH PETROLEUM NL.

(Inserted by DNRE - Vic Govt Mines Dept)

 FAHLEY-1 W.C.R.

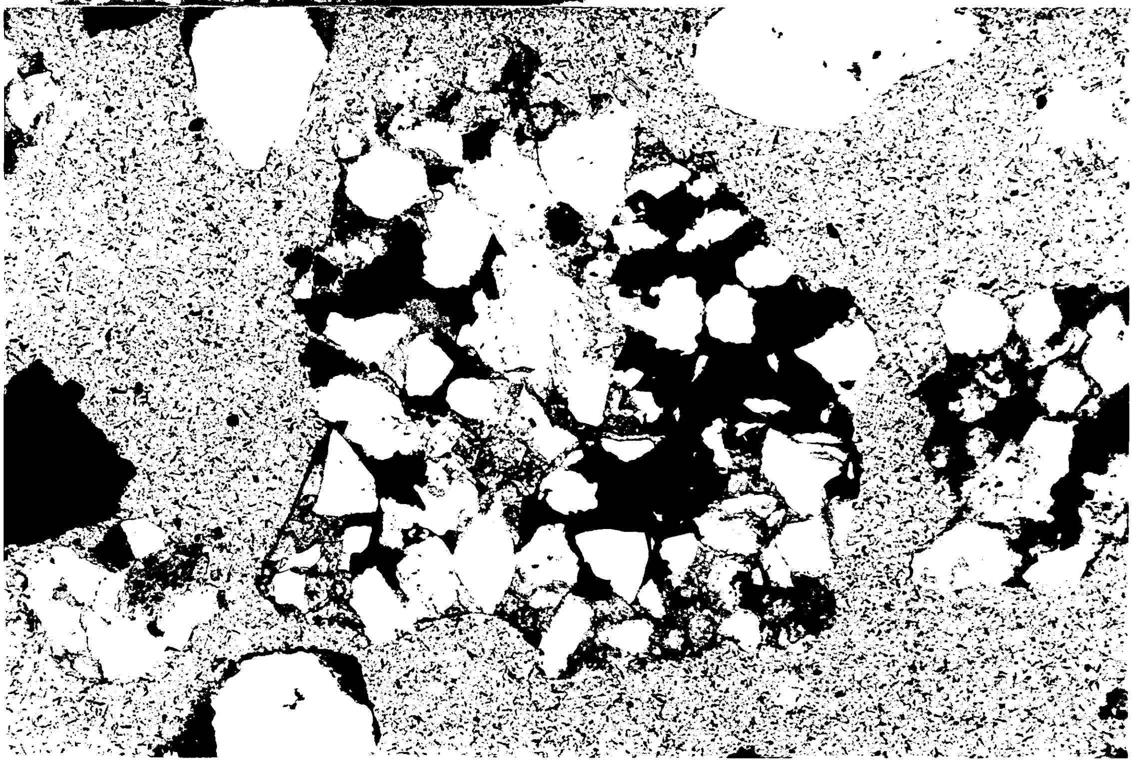

FIGURE 1

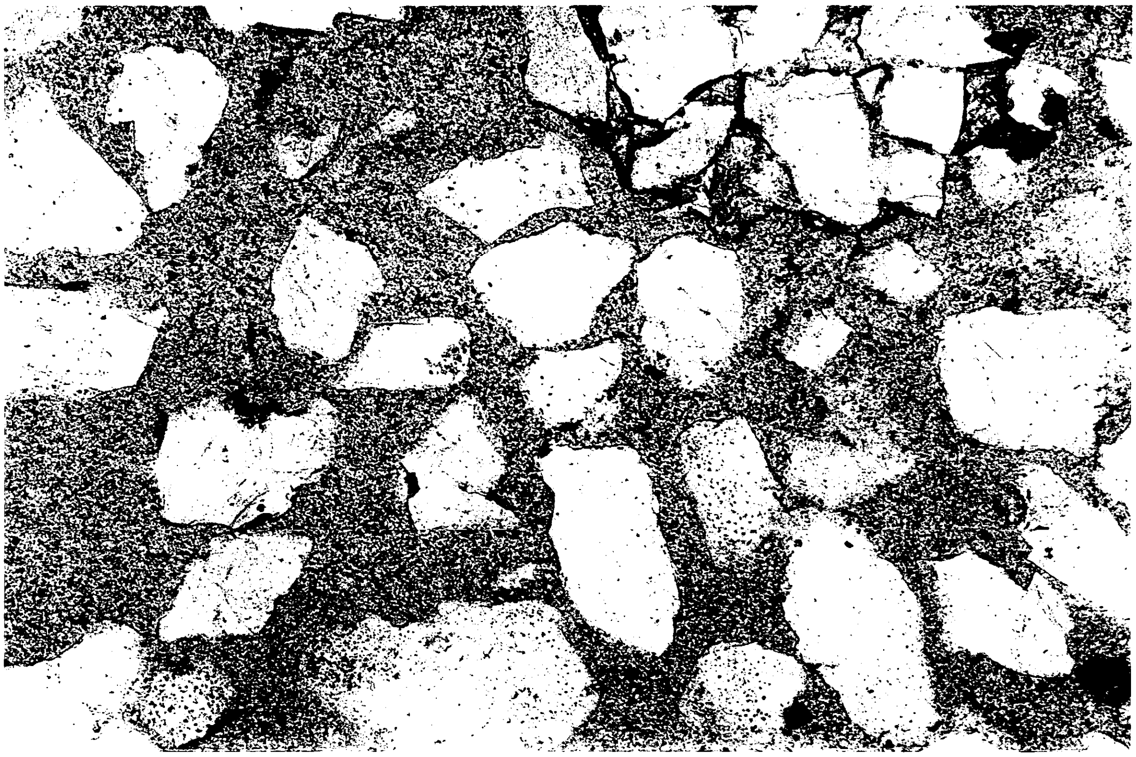

FIGURE 2

PE905757

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The enclosure PE905757 has the following characteristics:

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PERMIT = PEP/105
TYPE = WELL
SUBTYPE = PHOTOMICROGRAPH
DESCRIPTION = Core Photos (figures 3&4 from appendix 8 --petrography and x-ray diffraction analysis--of WCR) for Fahley-1
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DATE_CREATED =
DATE_RECEIVED = 17/02/86
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CONTRACTOR =
CLIENT_OP_CO = BEACH PETROLEUM NL.

(Inserted by DNRE - Vic Govt Mines Dept)

FIGURE 3

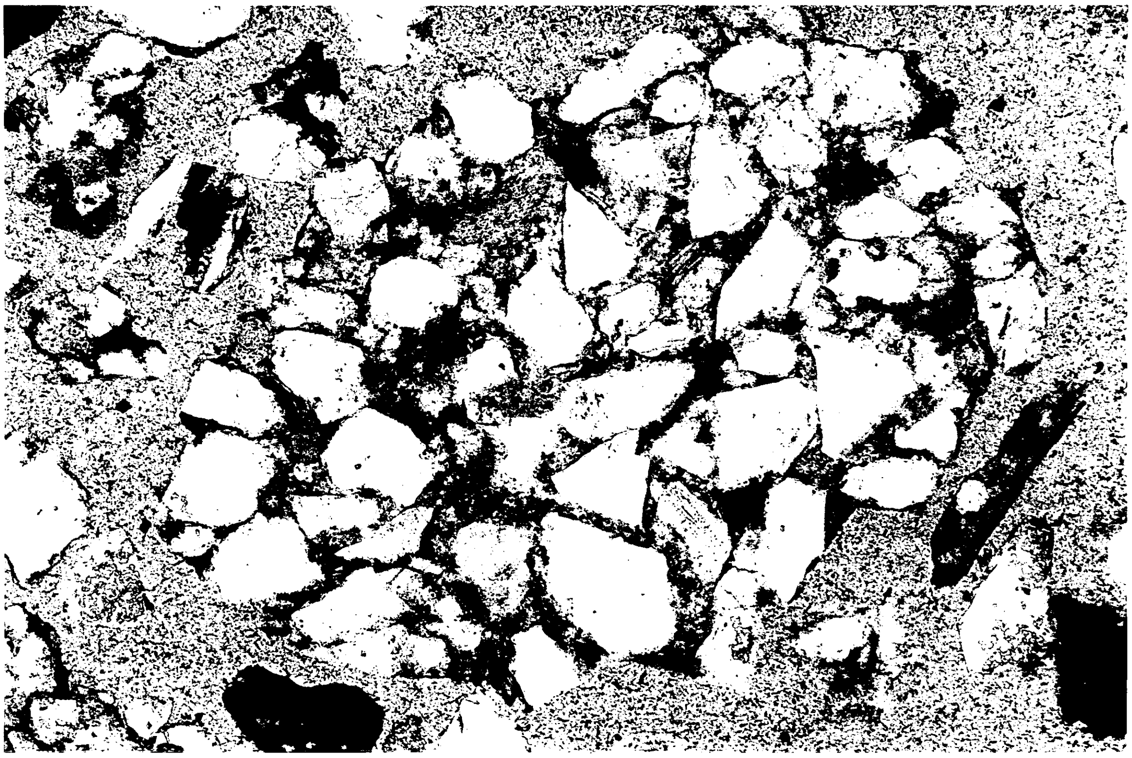

FIGURE 4

PE905758

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The enclosure PE905758 has the following characteristics:

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CONTAINER_BARCODE =	PE902402
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BASIN =	OTWAY BASIN
PERMIT =	PEP/105
TYPE =	WELL
SUBTYPE =	PHOTOMICROGRAPH
DESCRIPTION =	Core Photos (figures 5&6 from appendix 8 --petrography and x-ray diffraction analysis--of WCR) for Fahley-1
REMARKS =	
DATE_CREATED =	
DATE_RECEIVED =	17/02/86
W_NO =	W905
WELL_NAME =	FAHLEY-1
CONTRACTOR =	
CLIENT_OP_CO =	BEACH PETROLEUM NL.

(Inserted by DNRE - Vic Govt Mines Dept)

 FAHLEY-1. W.C.R.

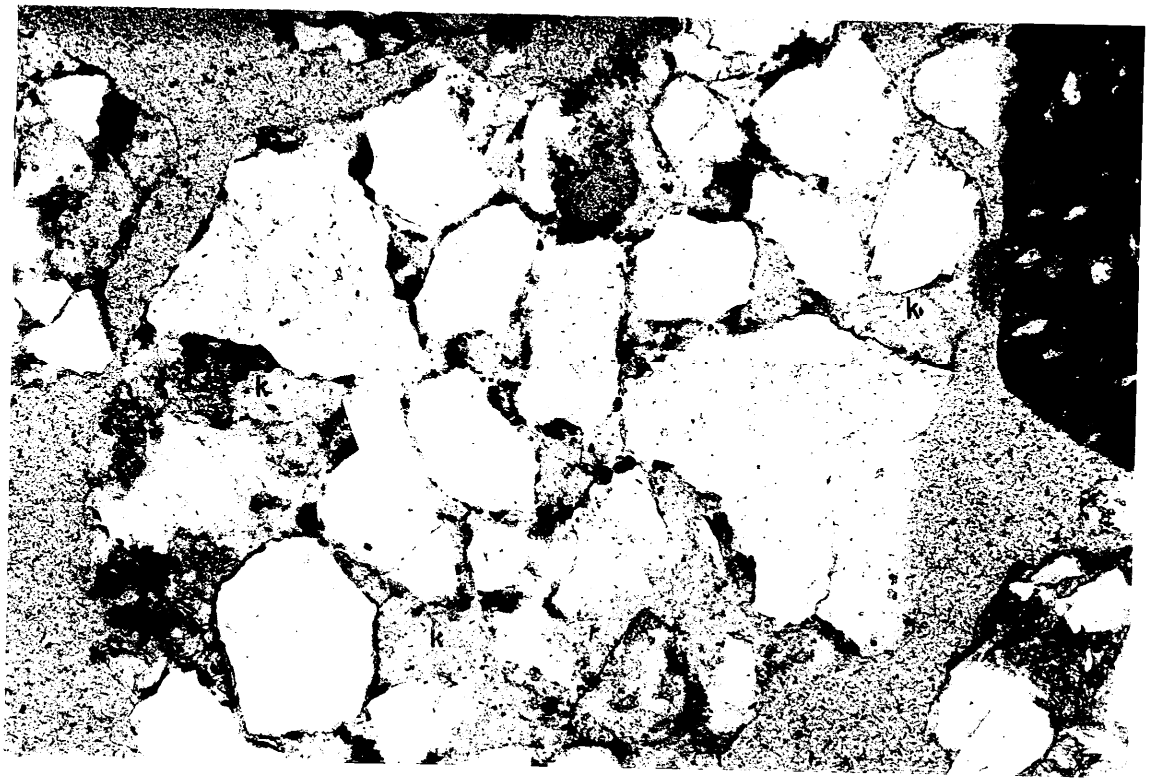

FIGURE 5

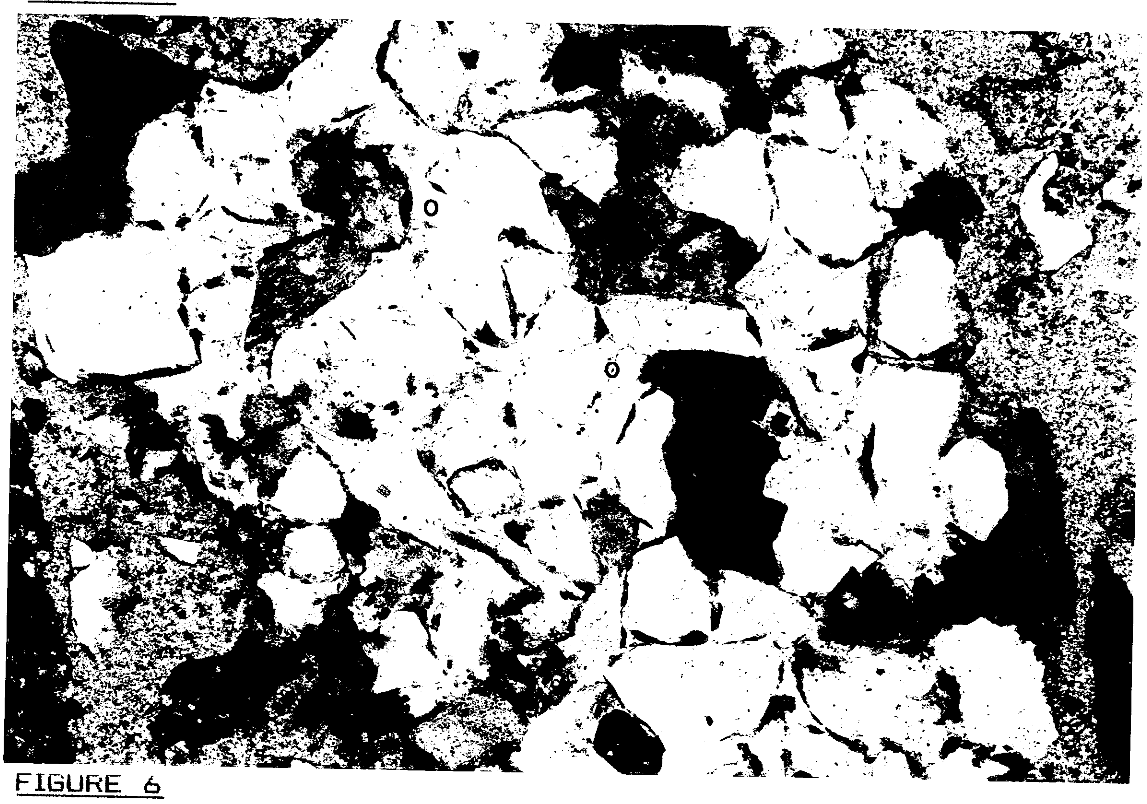

FIGURE 6

APPENDIX 9

ROCK-EVAL ANALYSIS

The Australian Mineral Development Laboratories

amdel

Flemington Street, Frewville,
South Australia 5063
Phone Adelaide (08) 79 1662
Telex AA82520

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

14 November 1985

F 3/944/0
F 6292 - Part 2

Beach Petroleum
PO Box 360
CAMBERWELL VIC 3124

Attention: Mr Tabassi

REPORT F 6292 - Part 2

YOUR REFERENCE: Letter dated 17 August 1985 from D.G. Langton

TITLE: Source rock evaluation, Fahley-1, Otway Basin

IDENTIFICATION: 1050-3200 m depth

MATERIAL: Unwashed cuttings

LOCALITY: FAHLEY-1

DATE RECEIVED: 21 August 1985

WORK REQUIRED: Total organic carbon and Rock-Eval pyrolysis

Investigation and Report by: Teresa O'Leary

Chief-Petroleum Services Section: Dr Brian G. Steveson

for Dr William G. Spencer
Manager
Mineral and Materials Sciences Division

tap

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1. INTRODUCTION

This report formally presents total organic carbon and Rock-Eval pyrolysis data for thirteen cuttings samples from Fahley-1 (Table 1). This report also includes brief descriptions of analytical procedures, graphical representation of data and interpretative comments.

2. ANALYTICAL PROCEDURE

2.1 Sample Preparation

Unwashed cuttings were ground in a Siebtechnik mill for 20-30 secs.

2.2 Total Organic Carbon (TOC)

Total organic carbon was determined by digestion of a known weight (0.1-0.5 g) of powdered rock in 50% HCl to remove carbonates, followed by combustion in oxygen in the induction furnace of a Leco IR-12 Carbon Determinator and measurement of the resultant CO_2 by infra-red detection.

2.3 Rock Eval Analysis

A 100 mg portion of powdered rock was analysed by the Rock-Eval pyrolysis technique (Girdel IFP-Fina Mark 2 instrument; operating mode, Cycle 1).

3. RESULTS

TOC and Rock-Eval pyrolysis data for the thirteen cuttings samples are listed in Table 1. Figures 1-4 are crossplots of hydrogen index versus Tmax which demonstrate kerogen type and maturity for the intervals shown in Table 1.

4. INTERPRETATION

4.1 Maturity

Tmax values range between 415-439°C for the section studied (Table 1) these values correspond to maturities of VR = 0.4-0.6% (Figures 1-4). Insofar as their dispersed organic matter comprises mainly woody herbaceous matter (Type II-III kerogen) the Tertiary Cretaceous sediments of the Fahley-1 section are immature for the generation of oil.

If contamination due to diesel based drilling mud can be ruled out the high production indices (>0.3) in the Paaratte and Belfast intervals suggests the presence of migrated hydrocarbons.

4.2 Source Richness

Organic richness is generally poor (TOC <2%) (Table 1), source richness also follows this trend. Potential yields characteristic of fair oil source beds (S_1+S_2 = 2-6 kg hydrocarbons/tonne) are found in the Pember, Paaratte and Belfast intervals. However, these values are high due to the large S_1 values.

4.3 Kerogen Type and Source Quality

The dispersed organic matter in the sediments of the Fahley-1 section has the bulk composition of gas prone Type III kerogen (Figs. 1-4). Samples with hydrogen indices in the range HI = 100-200 may have some liquids generating potential, but their organic leanness and immaturity detracts from their ability to expel significant quantities of oil.

TABLE 1

ROCK-EVAL PYROLYSIS 12/11/85

Client BEACH PETROLEUM

Well FAHLEY-1

DEPTH	T MAX	S1	S2	S3	S1+S2	PI	S2/S3	PC	TOC	HI	OI
PEMBER MEMBER											
1050.00	423	0.15	1.08	2.83	1.23	0.12	0.38	0.10	1.17	92	241
1150.00	426	0.16	2.73	10.84	2.89	0.06	0.25	0.24	1.84	148	589
1250.00	426	0.14	1.56	5.00	1.70	0.08	0.31	0.14	1.47	106	340
PAARATTE FORMATION											
2310.00	428	2.11	1.72	1.78	3.83	0.55	0.96	0.31	1.87	92	95
BELFAST MEMBER											
2400.00	432	1.80	1.89	1.96	3.69	0.49	0.96	0.30	2.10	90	93
2520.00	428	1.26	1.22	1.49	2.48	0.51	0.81	0.20	1.21	101	123
2620.00	434	0.86	1.58	1.14	2.44	0.35	1.38	0.20	1.37	115	83
2690.00	434	0.79	1.39	1.26	2.18	0.36	1.10	0.18	1.55	90	81
2780.00	427	0.31	0.66	1.12	0.97	0.32	0.58	0.08	0.70	94	160
WAARRE FORMATION											
2930.00	432	0.32	0.93	0.55	1.25	0.26	1.69	0.10	0.88	106	63
3010.00	438	0.13	0.52	0.60	0.65	0.20	0.86	0.05	0.71	73	84
3110.00	438	0.22	0.85	0.66	1.07	0.21	1.28	0.08	0.89	95	74
3200.00	439	0.23	1.49	0.26	1.72	0.13	5.73	0.14	1.52	98	17

KEY TO ROCK-EVAL PYROLYSIS DATA SHEET

	PARAMETER	SPECIFICITY
T max	position of S_2 peak in temperature program (^{o}C)	Maturity/Kerogen type
S_1	kg hydrocarbons (extractable)/tonne rock	Kerogen type/Maturity/Migrated oil
S_2	kg hydrocarbons (kerogen pyrolysate)/tonne rock	Kerogen type/Maturity
S_3	kg CO_2 (organic)/tonne rock	Kerogen type/Maturity *
$S_1 + S_2$	Potential Yield	Organic richness/Kerogen type
PI	Production Index ($S_1/S_1 + S_2$)	Maturity/Migrated Oil
PC	Pyrolysable Carbon (wt. percent)	Organic richness/Kerogen type/Maturity
TOC	Total Organic Carbon (wt. percent)	Organic richness
HI	Hydrogen Index (mg h'c (S_2)/g TOC)	Kerogen type/Maturity
OI	Oxygen Index (mg CO_2(S_3)/g TOC)	Kerogen type/Maturity *

*Also subject to interference by CO_2 from decomposition of carbonate minerals.

FIGURE 1

Client : BEACH PETROLEUM
Well name : FAHLEY-1
Interval : PEMBER MEMBER

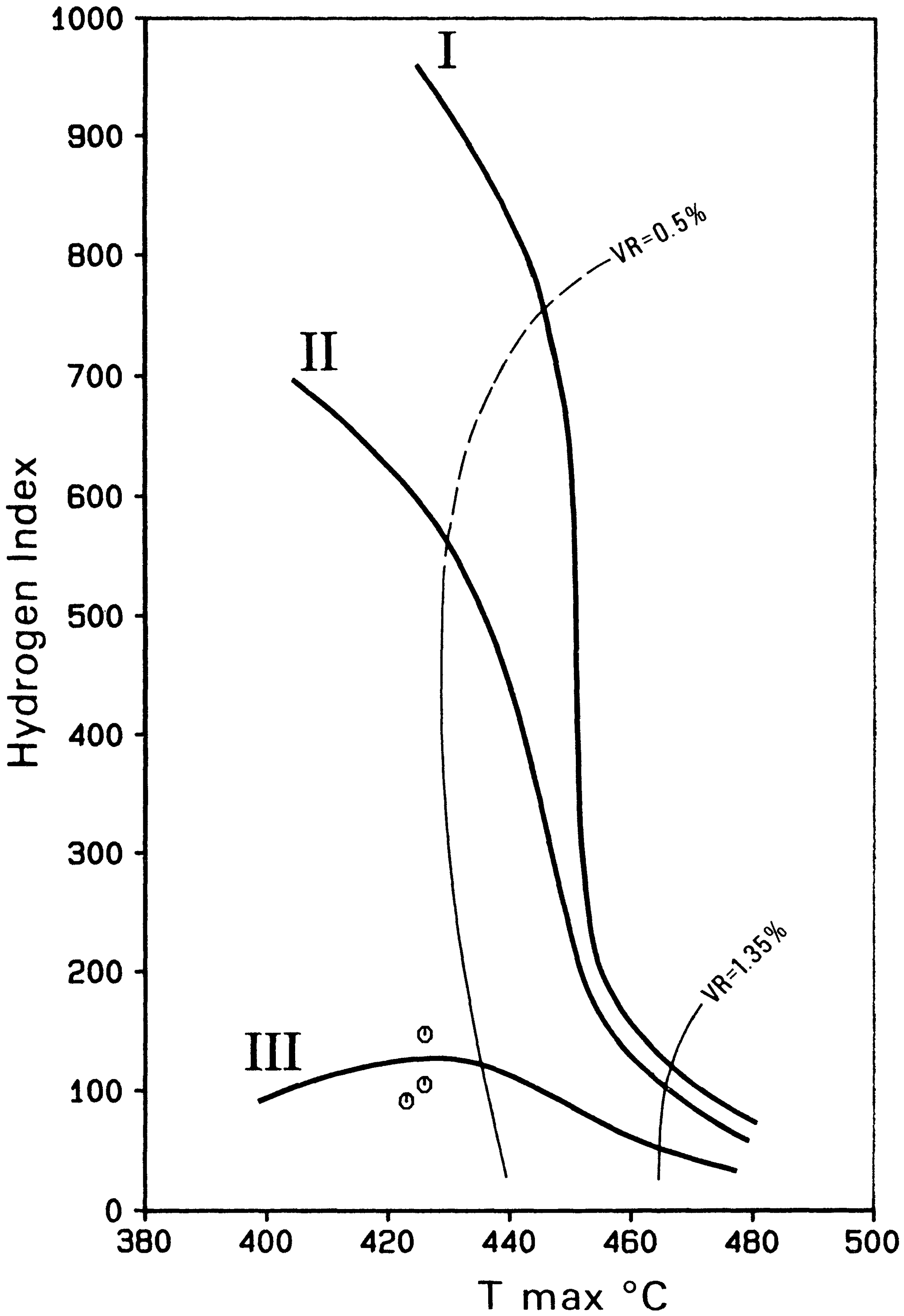


FIGURE 2

Client : BEACH PETROLEUM
Well name : FAHLEY-1
Interval : PAARATTE FORMATION

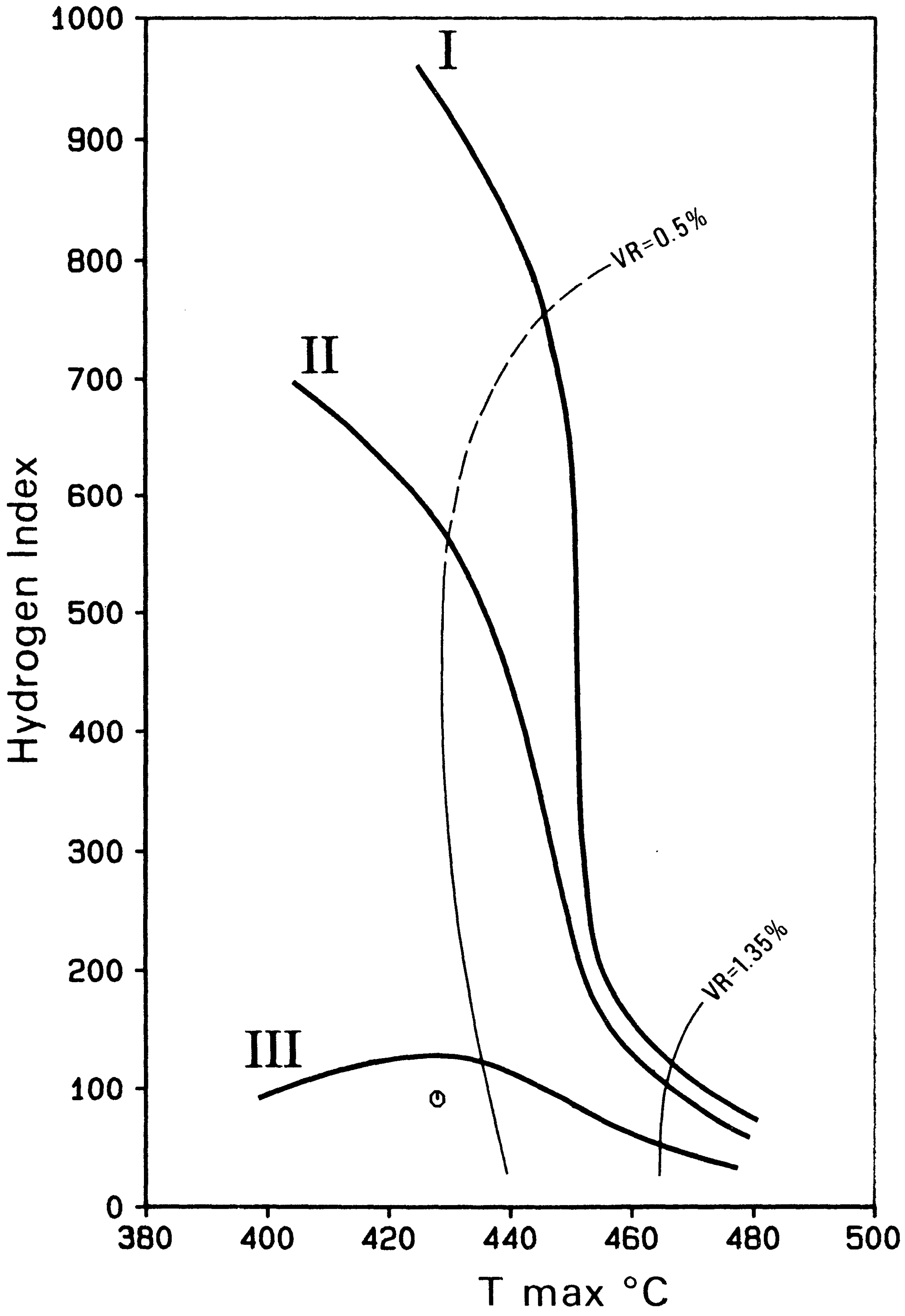
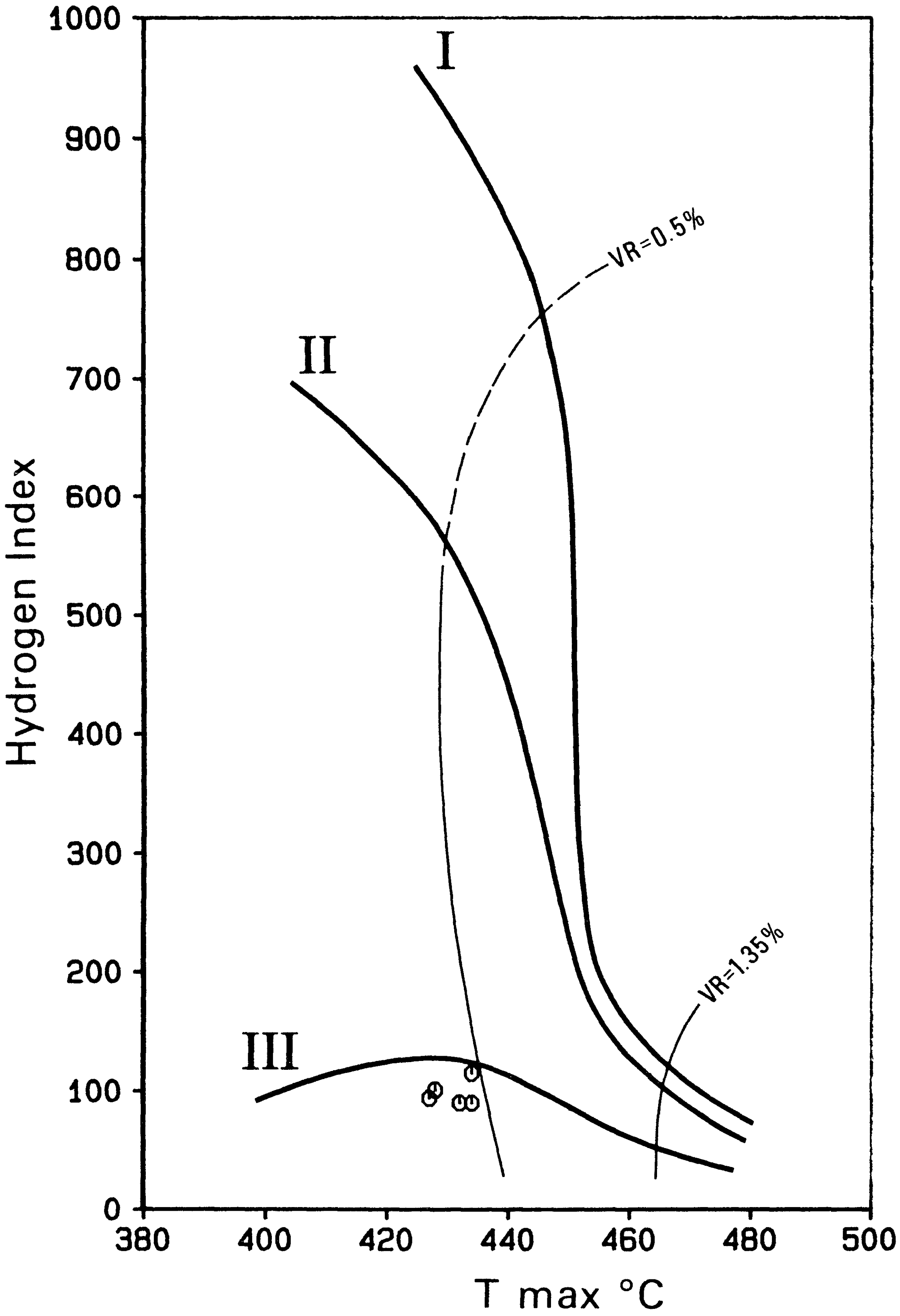
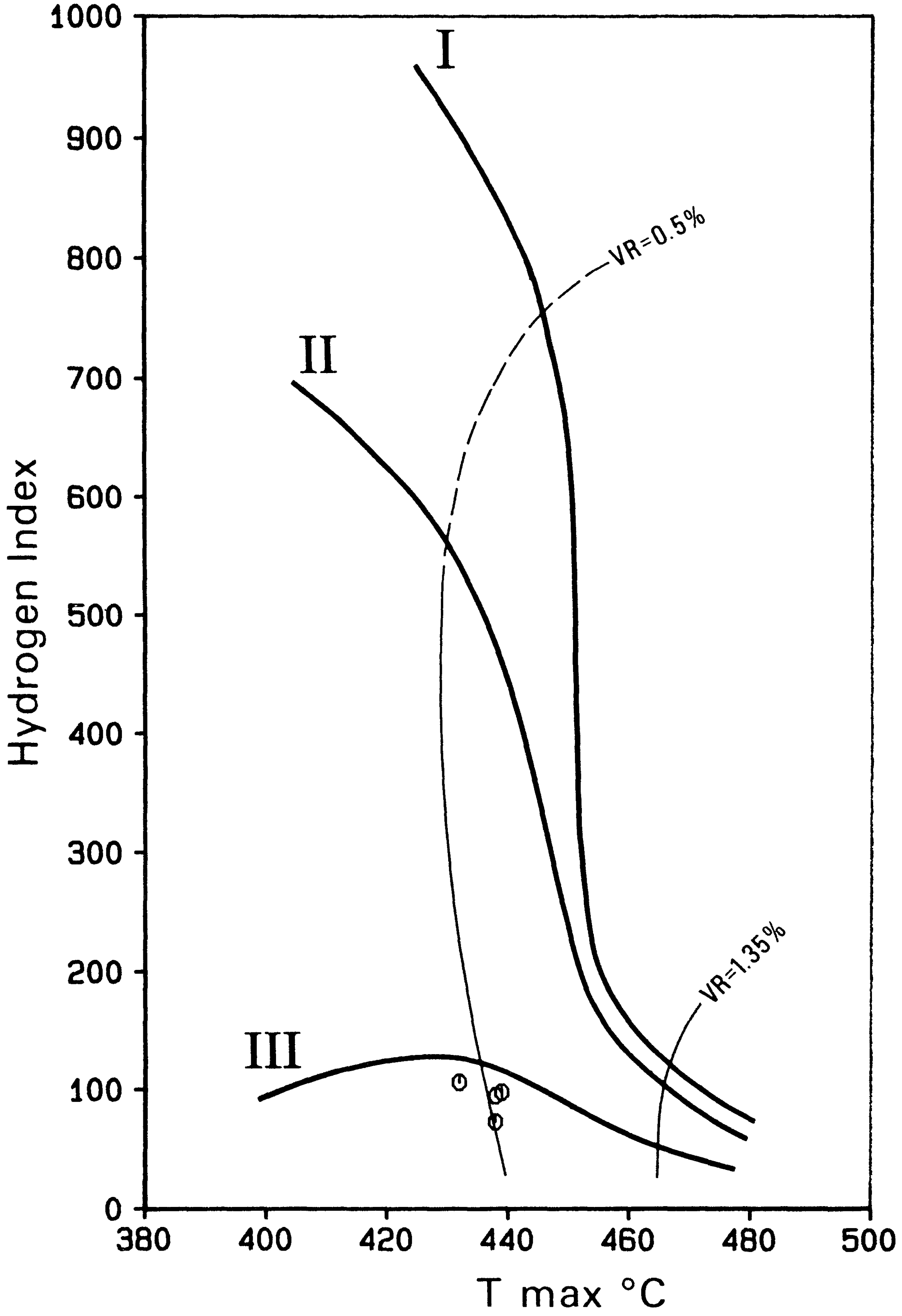


FIGURE 3

Client : BEACH PETROLEUM
Well name : FAHLEY-1
Interval : BELFAST MEMBER



Client : BEACH PETROLEUM
Well name : FAHLEY-1
Interval : WAARRE FORMATION



APPENDIX 10

PALYNOLOGICAL STUDIES

Geological Survey of Victoria

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

By

V. Archer

Geological Survey of Victoria, 1985

CONTENTS

INTRODUCTION

Samples from the Beach Petroleum well, Fahley No. 1, were examined for palynological dating purposes. The well is located near Dartmoor in south-western Victoria.

All the samples examined are cuttings and the reliability of the age determinations is only fair.

Contamination from uphole is evident in most of the samples, either from Tertiary (early Eocene and Paleocene) or from younger Late Cretaceous sediments.

There is also evidence of re-working of Permian and Early Cretaceous deposits.

A Kerogen and thermal maturation analysis was made for each of the samples although the reliability of this type of analysis for cuttings must also be considered to have low reliability.

RESULTS OF PALYNOLOGICAL DATING OF FAHLEY NO. 1

SAMPLE DEPTH (m)	CONFIDENCE RATING	AGE	SPORE-POLLEN ZONE (DETTMANN & PLAYFORD 1969)
2020-2030	3	Senonian : late Santonian to middle Campanian	
2300-2310	3	Senonian : early Santonian to middle Campanian	Mid <u>T.pachyexinus</u> Zone to middle Campanian
2400	3	Early Turonian to early Campanian	<u>C.triplex</u> Zone to early Campanian
2671	3	Early Turonian	Early <u>C.triplex</u> Zone
2815	3	Late Cenomanian to early Turonian	Late <u>A.distocarinatus</u> to early <u>C.triplex</u> Zones
2925	3	"	"
3055	3	Early-mid Cenomanian	Early <u>A.distocarinatus</u> Zone
3200	3	"	"

CONFIDENCE RATINGS.

0-2. Apply to SWC and core material only.
3. Cuttings, <u>Fair Confidence</u>, assemblage with zone species of either spores and pollen or microplankton, or both.
4. Cuttings, <u>No Confidence</u>, assemblage with non-diagnostic spores, pollen and/or microplankton.

SPECIES LIST : FAHLEY NO.1

SPORE-POLLEN DEPTH (m)	2020-2030	2300-2310	2400	2671	2815	2925	3055	3200
Alisporites grandis				x			x	
Amosopollis cruciformis		x	x	x	x			
Appendicisporites distocarinatus							x	
Araucariacites australis	x							
Arcellites reticulatus				x			x	
Australopollis obscurus	x				c			
Baculatisporites comaumensis		x		x	x	x	x	
Balmeisporites glenelgensis				x			x	x
B.holodictyus				RW				x
Bankseidites elongatus			c					
Ceratosporites equalis	x		x					
Cicatricosisporites australiensis		x		x	x		x	x
C.cuneiformis	x		x	x	x		x	x
C.hughesi						x		
C.ludbrooki								RW
C.pseudotripartitus					x	x		x
Classopollis cf C.chateaunovi					x			x
C.classoides							x	
Clavifera triplex		x	x	x	x	c	c	
Cyathidites asper				x	x			
C.australis		x		x	x	x		x
C.minor	X							
Dictyotosporites complex		x		RW				
D.speciosus				RW	RW	RW		
Dilwynites granulatus		c						
Foraminisporis dailyi	x							
Gambierina edwardsii		c						

SPORE-POLLEN DEPTH (m)	2020-2030	2300-2310	2400	2671	2815	2925	3055	3200
G.rudata	x	x						
Gingkocycadophytus nitidus				x				
Haloragacidites harrisii	c		c			c		
Intratriporopollenites notabilis				c				
Kraeuselisporites jubatus							x	
K.majus				RW			x	
Laevigatosporites major		x	x				x	
Latrobosporites amplus	x							
L.ohaiensis		x						
Lygistepollenites florinii				c				
Malvacipollis diversus	c		c	c				
Microcachyridites antarcticus	x	x	x	x	x			x
Myrtaceidites sp.	c			c				
Nothofagidites endurus		c						
Ornamentifera sentosa	x	x						
Osmundacidites wellmanii	x	x	x	x				x
Parasaccites gondwanensis	RW	RW		RW	RW	RW		
Phimopollenites pannosus			x				x	x
Phyllocladidites mawsonii	x	x	x	x		x	x	
Pilosisporites grandis								RW
P.parvispinosus				RW				
Podocarpidites ellipticus			x					
Podosporites microsaccat us				x		x	x	x
Polycolpites sp.	c							
Proteacidites amolosexinus	x		c	c				
P. of P.angulatus	x							
P.crassus	c							
P.grandis	c	c		c				

SPORE-POLLEN	DEPTH (m)	2020-2030	2300-2310	2400	2671	2815	2925	3055	3200
[illegible]opiensis		c			c				
P.leightonii					c				
P.ornatus			c						
Tricolpites gillii		x							
Trilobosporites tribotrys			RW						
Triorites minor		x			x	x	x		
Triporopollenites cf T.sectilis		x							
Triporoletes reticulatus			x		x				
T.radiatus			x						
Tsugaepollenites dampieri								x	
T.trilobatus								x	

MICROPLANKTON	2020-2030	2300 2310	2400	2671	2815	2925	3055	3200
[illegible].Adnatosphaeridium chonetum	x							
Batiacasphaera scrobiculata	x							
Canningia rotundata	x							
Ceratiopsis obliquipes	c							
Cleistosphaeridium ancoriferum							x	
Cribroperidinium edwardsii				x				x
Cyclonephelium compactum		x			x		x	x
C.distinctum	x	x	x		x		x	x
Deflandrea spp.	x					x		
Dinogymnium nelsonense	x							
Exochosphaeridium cf.E.phragmites	x	x					x	
Fromea amphora		x						
F.fragilis				x	x	x		
Heterosphaeridium heteracanthum	x	x					x	
Hystrichosphaeridium cf.H.difficile	x							
Isabelidinium cretaceum	x							
I.sp. cf I.druggii		x						
aff.Kallosphaeridium romaense					x			
Leptodinium cf L.simplex	x							
O.operculata	x	x						
Oligosphaeridium pulcherrimum							x	
Spinidinium sp.		x						
Spiniferites ramosus	x	x		x	x		x	
S. cf S.wetzelii		x						
Trichodinium hirsutum	c							

c = cavings
RW = re-worked

KEROGEN ANALYSIS : FAHLEY NO.1

DEPTH (m)	TAI	SPORE-POLLEN (%)	MICROPLANKTON (%)	STRUCTURED TERRESTIAL (%)	BIODEGRADED TERRESTIAL (%)	INERT OPAQUE FUSIAN (%)	AMORPHOUS SAPROPELIC (%)
2020-2030	4	3.0	x	2.5	31.0	64.0	-
2300-2310	4	x	x	x	13.0	87.0	1.0
2400	4	0.5	x	x	6.5	93.0	-
2671	4	2.5	x	-	15.0	79.5	2.9
2815	4	1.0	x	-	24.0	72.5	2.5
2925	4	x	x	-	9.5	89.0	1.5
3055	+4	x	x	x	45.0	60.0	1.5
3200	+4	1.0	x	6.0	35.0	72.5	x

% to nearest 0.5

DISCUSSION AND CONCLUSIONS

a) PALYNOLOGY OF THE SEDIMENTS

2020-2030m: A possible age of late Santonian to middle Campanian is suggested by the occurrence of the spore-pollen species L.amplus, O.sentosa, T.gillii, P.amolosexinus and G.rudata. Dinoflagellate species present which are restricted to the Senonian, or have their first or final appearance during this time are I.cretaceum, H.heteracanthum, C.rotundata, D.nelsonense and O.operculata.

2300-2310m: The spore-pollen species O.sentosa, C.triplex and L.ohaiensis together in the assemblage, suggest an age range of early Santonian to middle Campanian.

2400m: The palynomorph yield from this deposit was low, and basing the age range on the species C.triplex alone (other index fossils not being observed) the possible age range is early Turonian to early Campanian. i.e. from the base of the C.triplex Zone to the early Campanian.

2671m: The assemblage contains the spore-pollen species B.glenelgensis which ranges from the early Cenomanian to the early Santonian, and the dinoflagellate species C.edwardsii which has its final appearance in the early Turonian. A possible age range of early Cenomanian to early Turonian is indicated. i.e. early A.distocarinatus to early C.triplex Zones. The presence of C.triplex, if not from cavings, may indicate the early part of the C.triplex Zone. i.e. early Turonian .

2815-2925m: The presence of the spore-pollen species T.minor suggests that the assemblage is not older than the late A.distocarinatus Zone. i.e. late Cenomanian.

3055m: This is the youngest sample in which the species A.distocarinatus is observed, and this species together with B.glenelgensis, P.pannosus and K.jubatus indicate an early-mid Cenomanian age. i.e. early A.distocarinatus Zone.

3200m: A similar assemblage to 3055m is present at this depth and a similar age is indicated.

b) KEROGEN ANALYSIS

The samples are all considered to be of 4 or 4+ on Batten's TAI scale. That is, based on a subjective observation of an unornamented spore(s) the colour corresponds to a 4. i.e. light-medium brown; or a +4, which lies between 4 and 5 (dark brown). This colour falls within the wet or dry hydrocarbon generation range. All samples are high in inert, opaque material. Structured terrestial material is low in all samples but biodegraded terrestial material occurs significantly in all samples, and is highest at 2020-2030m, 3055 and 3200m.

The organic constituents of these samples, while comprising mainly opaque material and recognizable plant debris, do contain some amorphous material. From Staplin 1969, a mixture of amorphous and recognizable plant material tends to have "wet" hydrocarbon potential.

It should be noted that the percentages determined do not take into account whether or not the material is derived from reworked, in situ or caved material. As such, the reliability of the analysis cannot be accepted with a high degree of confidence.

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