MAPLE OIL & EXPLORATION NL

OPEN FILE

CARMICHAEL #1

WELL COMPLETION REPORT

ATP-588P

QUEENSLAND

by

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Melbourne
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CR29695A

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1.0 SUMMARY AND CONCLUSIONS

The Carmichael Prospect was first identified by Canso Resources Limited following a regional and semi-detailed seismic survey in 1982 as part of its farmin requirement with the ATP-239P permit holders led by Leighton Mining NL, a subsidiary of Endeavour Resources Limited at that time. Leighton and its coventurers completed an additional seismic survey at Carmichael in 1985, after Canso withdrew from further farmin work in the permit for non-technical reasons, specifically to confirm closure along the southeastern flank of the anticline. This seismic survey confirmed southeastern closure. Leighton and its coventurers whilst technically interested in drilling the Carmichael Prospect chose not to proceed with drilling. Subsequent permit holders, AGL Petroleum Ltd and Santos Limited, also did not drill Carmichael and relinquished the permit. Maple Oil & Exploration NL applied for and was awarded ATP-588P, which included the Carmichael Prospect, in August, 1994.

Carmichael #1 was sited as an exploration well to test the Carmichael Prospect: a large, anticlinal feature at the top of the Lake Galilee Sandstone on the western flank of the Koburra Trough in the Galilee Basin, Central Queensland. A maximum vertical relief of 22 msec (110 ft) was mapped with an areal closure of 26.8 sq km.

The primary objective of the well was to test porous and permeable zones at the top and within the Lake Galilee Sandstone of Permo-Carboniferous age. Secondary objectives included reservoir sands within the overlying Jericho Formation of Early Permian age.

The Carmichael well was located about 25 km north-northeast of Lake Galilee #1 (drilled by Exoil NL in 1964) and about 100 km southeast of Koburra #1 (drilled by Flinders Petroleum NL in 1971).

Lake Galilee #1 took 137 days to reach a total depth of 3,406m after cutting 43 cores and running nine DST's. Koburra #1 took 60 days to reach a total depth of 3,259m after cutting eight cores. Koburra was air drilled from 2,300m to total depth.

At Lake Galilee #1, a test of the interval 2,645-2,668m (DST-5) in the upper part of the Lake Galilee Sandstone flowed gas to surface at a rate too small to measure and recovered 3m of light green oil (43.1^0 API gravity).

Gas was flared at Koburra #1 from the blooey line when drilling with air at 2,941m in the lower part of the Lake Galilee Sandstone.

The Carmichael #1 well was originally programmed to a total depth of 3,100mKB and was expected to take up to 70 days to drill based on past experience of the drill results at both Lake Galilee #1 and Koburra #1.

Maple spudded the Carmichael #1 well on April 25, 1995 using OD & E's Rig-32, a National 610E, and reached a total depth of 2,855mKB on June 23, 1995. The time taken to reach total depth was 51.64 days from spud. Two casing strings were used at the well: the $13^{3/8}$-inch was set at 279m and the $9^{5/8}$-inch at 1,700m. A total of 15 drill bits were used at the well compared with the use of 92 bits to reach a similar depth at the Lake Galilee well.

Access to the wellsite was either by road south from Charters Towers (262 km), Clermont, or Barcaldine-Aramac. The well was sited on Carmichael Station with station homestead being some 7 km by road east of the location.

An unsealed airstrip at Moonoomoo Station some 25 km by road north of the wellsite was used for crew changes with a twin engine aircraft.

The Carmichael #1 well penetrated the Eromanga and Galilee Basin sediments as anticipated and bottomed in clastic rocks of the Drummond Basin sequence of Devonian age.

The well was a valid test of the mapped structure. All formation tops drilled high when compared with Lake Galilee #1. The top of the Drummond sequence was much higher than expected, supporting the existence of a paleo-high at early Lake Galilee Sandstone time with early structural growth.

Numerous shows of oil and gas were recorded while drilling through the Galilee Basin sediments. A total of 11 drill stem tests were conducted at the well with three separate zones in the Lake Galilee Sandstone flowing gas to surface at rates too small to measure.

The Lake Galilee Sandstone target zone was intersected as expected but, unfortunately, the poor porosity and permeability of the gas-bearing intervals precluded commercially viable gas flows.

The well confirmed the presence of gas-bearing intervals in the Lake Galilee Sandstone. Future exploration potential lies in defining prospective areas where the porosity and permeability of the Lake Galilee Sandstone is enhanced.

2.0 GENERAL DATA

2.1 OPERATOR

Maple Oil & Exploration NL (Maple)
Level 2
22 William Street
Melbourne, Victoria 3000

2.2 WELL NAME

Carmichael #1

2.3 ELEVATION

Ground Level (GL):	287.7 metres above mean sea level
Kelly Bushing (KB):	293.8 metres above mean sea level

(All depth references in this report correspond to metres KB unless stated otherwise)

2.4 WELL LOCATION

(See Appendix-1 for Wellsite Survey Report)

Latitude:	21^0	57'	27.6076" South
Longitude:	146^0	02'	01.5340" East

Easting:	4002030.47
Northing	7571535.53

Exploration Permit:	ATP-588P (100% Maple)
Graticular Block:	1681

District: Aramac (Carmichael Station)

Station Owner:
Allan Parker
"Allambie"
Mt Wilson Road
via Kilcummin
Queensland
(Tel: 079-835-347 "Allambie")
(Tel: 077-876-403 "Carmichael")

2.5 DRILLING RIG USED

Oil Drilling and Exploration Pty Ltd (OD & E) drilled the well with Rig-32, a National-610E rig, having a rated capacity of 3,500 metres (11,485 feet) using 114mm ($4^{1/2}$-inch - 16.6 lbs/ft) drill pipe.

The drawworks consisted of a National-610E with a Parmac 281 hydromatic brake having a Horsepower rating of 750/1000 input powered by a General Electric Model 5GE752ARI DC traction type electric motor with a 5HP blower motor.

The substructure was a Dreco four section box style with a maximum pipe set back capacity of 300,000 lbs and a maximum rotary table capacity of 400,000 lbs.

The mast was a Dreco Cantilever Type 133 with 133 feet clear height and a 21 foot wide base mast.

The mud pumps included two National Type 8P-80, 6-inch by $8^{1/2}$-inch Triplex single acting pumps 800HP complete with a Hydril pulsation dampener K-20-3000 and a Demco 3-inch shear relief valve. The pumps were powered by GE 752 DC traction motors.

Three 600V Brown-Boveri generators (Model #717, 650Kva, 60Hz synchronous alternators) provided electric power for the rig.

A 30 man airconditioned camp was supplied with two toolpushers units. An average of 18 drilling contractor personnel, plus a Drilling Supervisor, Wellsite Geologist, a Mud Engineer and two Mudlogging personnel, were on site during the drilling of the well representing a minimum of 23 people at any one time.

2.6 DRILLING SCHEDULE

Date Well Spudded:	1600 hours on April 25, 1995
Date Well Reached Total Depth:	0715 hours on June 16, 1995
Date Rig Released:	0600 hours on June 23 , 1995
Total Time to Reach Total Depth:	51.64 days
Total Time to Rig Release:	58.58 days

(See Figure-1 for the Drilling Rate Curve and Table-1 for Daily Operational Details).

2.7 TOTAL DEPTH

The well reached a total depth of 2,855.3 metres KB.

2.8 WELL STATUS

After wireline logging, four inflate-straddle drill stem tests (DST-8, 9, 10 and 11) were conducted before a decision was made to plug and abandon the well.

QDME gave Maple approval on June 20, 1995 to plug and abandon the well after setting two cement plugs: one to cover the water zone between 2,086-2,089m; and the other at the $9^{5/8}$-inch casing shoe.

Plug #1 was placed over the interval 2,060-2,106m (length 46m) with 80 sax Class 'G' cement.

Plug #2 was placed over the interval 1,675-1,725m (length 50m) with 80 sax Class 'A' cement. This plug was tagged at 1,682m with 10,000 lb weight.

A 5m cement plug was set at the top of the $13^{3/8}$-inch casing after cutting and recovering the casing head.

A steel marker plate suitably inscribed with the well name and number, depth and date of abandonment was cemented to the casing at least two metres above ground level.

2.9 WATER SUPPLY DETAILS

A water bore, Mosquito #1, was drilled some 70 metres east-northeast (242^0 magnetic) of the Carmichael #1 location to a total depth of 234m to provide rig and camp water. The bore was cased and packed with 6-inch PVC casing slotted over five intervals. An airlifting procedure was conducted separately over each slotted interval which gave the following results:

64-71m	200 gph rate (1,770 ppm NaCl)
75-85m	900 gph rate (2,300 ppm NaCl)
110-127m	2,000 gph rate (1,360 ppm NaCl)
150-170m	3,000 gph rate (1,060 ppm NaCl)
210-226m	3,300 gph rate (770 ppm NaCl)

The bore was pumped tested at various levels with a Mono Borehole Pump, Model # DMK-3. The static water level before pumping commenced was measured at 30m. The pump was belt driven by a Yamar TF-110 diesel motor. The motor had a continuous output of 7.4Kw (2,400rpm) and a maximum output of 8.1Kw (2,400rpm).

The results of the pump tests were:

1,300 gph at 45m
3,000 gph at 80m
3,000 gph at 92m

The bore was completed with the pump suction being set at 150m which provided for an available drawdown of 120m. The initial drawdown was some 75m at a constant pump rate of 3,300gph, which stabilised at 85m after 5-hours continuous pumping. This result indicated that the bore had a Safe Pumping Rate well in excess of 3,300gph.

An analysis of the water was carried out at the wellsite which gave the following results:

pH	Strip	7.5
(OH^-)	PSIS meter	7.6
Chloride	by 0.0282 $AgNO_3$ solution	800 ppm
(Cl^-)	by 0.2820 $AgNO_3$ solution	<1,000 ppm
Total Hardness (as $CaCO_3$)	by Manver Indicator Test	380 ppm
Calcium	by Molecular Weight	152 ppm
Magnesium (Mg^{++})	by Versenate Titration	97 ppm

Water was pumped to the camp and turkeys nest separately through 2-inch poly-pipe. The bore produced water at the turkeys nest (appropriately lined with a pit liner) at a measured rate of 2,800gph.

3.0 DRILLING DETAILS

3.1 BLOWOUT PREVENTER EQUIPMENT

The BOP's included a $13^{3/8}$-inch, 5,000# Hydril Type GK annular preventer, and a $13^{3/8}$-inch, 5,000# Hydril Type V single gate ram preventer complete with $9^{5/8}$, 7, $5^{1/2}$, $4^{1/2}$, $3^{1/2}$, $2^{7/8}$, $2^{3/8}$-inch CSO ram assemblies.

3.2 HOLE SIZE AND CASING DETAILS

The size of hole drilled from surface to total depth was:

660mm (26)	to	9m
445mm ($17^{1/2}$)	to	232m
311mm ($12^{1/4}$)	to	1,704m
216mm ($8^{1/2}$)	to	2,855m

The casing sizes were:

508mm (20)	to	9m
340mm ($13^{3/8}$)	to	279m
244mm ($9^{5/8}$)	to	1,700m

A surface string of 22 joints of 340mm ($13^{3/8}$-inch) 61 lb/ft (36#) N80, Range 3, 8RND, ST & C casing was used.

An intermediate string of 137 joints of 244mm ($9^{5/8}$-inch) 40 lb/ft N80, Range 3, 8RND, ST & C casing was used. A Leak Off Test at 2,400psi equivalent to 17.4ppg was conducted.

3.3 DEVIATION SURVEYS

Totco deviation surveys were run at frequent intervals and usually at pipe connections. The results of the deviation surveys at the well are as follows:

0.50^0	@	29.6m
1.00^0	@	93.6m
0.50^0	@	98.6m
0.50^0	@	176.2m
0.50^0	@	277.0m
1.00^0	@	304.0m
0.50^0	@	457.6m
1.50^0	@	610.4m
1.00^0	@	755.5m
1.75^0	@	908.5m
1.75^0	@	965.8m
1.75^0	@	1037.0m
1.00^0	@	1113.7m
Misrun	@	1257.0m
1.50^0	@	1267.0m
1.75^0	@	1354.0m
1.75^0	@	1506.4m
1.50^0	@	1602.0m
Misrun	@	1675.0m
1.75^0	@	1694.0m
1.00^0	@	1723.0m
1.00^0	@	1885.0m
1.00^0	@	1932.6m
1.25^0	@	2093.0m
1.50^0	@	2189.0m
1.50^0	@	2369.0m
Misrun	@	2471.0m
1.25^0	@	2484.0m
1.00^0	@	2579.0m
1.00^0	@	2675.0m
1.00^0	@	2740.0m

3.4 CEMENTING OPERATIONS

The 508mm (20-inch) conductor pipe was set at 9m and cemented to surface by OD &E.

The 340mm ($13^{3/8}$-inch) casing was cemented with a slurry of 750 sax of Class 'A' cement with the shoe set at a depth of 729m. The slurry volume was 152bbls The returns to surface were good with returns after 104bbls displacement. The plug was bumped with 1,000psi and held well.

The 244mm ($9^{5/8}$-inch) casing was cemented with a lead of 330 sax of Class 'A' cement followed by a tail of 150 sax of Class 'G' cement. The displacement was 419.5bbls. The plug was bumped and pressure tested with 2,000psi for 10 minutes. The casing shoe was set at 1,700.5m.

3.5 BIT RECORD

Aside from the 660mm (26-inch) augur used to drill surface hole for setting the 508mm (20-inch) conductor pipe, a total of 15 bits were used to drill the well. These bits included:

Bit #	Size	Make	Type
1	445mm ($17^{1/2}$)	Smith	DSJ
2	311mm ($12^{1/4}$)	Varel	L-114
3	311mm ($12^{1/4}$)	Varel	ETD-417
4	311mm ($12^{1/4}$)	Smith	F-2
5	311mm ($12^{1/4}$)	Hughes	ATJ-22
6	311mm ($12^{1/4}$)	Hughes	ATJ-22
7	216mm ($8^{1/2}$)	Varel	ETD-537
8	216mm ($8^{1/2}$)	Varel	ETD-537
9	216mm ($8^{1/2}$)	Hughes	ATJ-33
10	216mm ($8^{1/2}$)	Hughes	ATJ-33
11	216mm ($8^{1/2}$)	Smith	F-2
12	216mm ($8^{1/2}$)	Smith	F-3
13	216mm ($8^{1/2}$)	Hughes	ATJ-33
14	216mm ($8^{1/2}$)	Hughes	ATJ-44
15	216mm ($8^{1/2}$)	Hughes	ATJ-44

The drilling bits were supplied by Tasman Oil Tools on a consignment basis.

More detail about the performance of the bits used is provided in Table 2.

3.6 DRILLING FLUID DETAILS

Interval
0 - 282 metres ($17^{1/2}$-inch hole)

Before mixing mud an analysis of the make-up water from the Mosquito #1 water bore adjacent to the Carmichael #1 location was carried out. The test results indicated a chloride level of 800ppm with magnesium at 97ppm and calcium at 152ppm.

The make-up water was treated with approximately 0.5ppb caustic soda to treat magnesium hardness and 0.5ppb bicarbonate of soda to treat the calcium hardness. Two premix tanks totalling 280bbl of fluid were then treated with 20ppb bentonite to give sufficient spud mud to commence drilling with a funnel viscosity in excess of 60sec/qt.

Carmichael #1 was spudded at 1600 hours on April 25, 1995 with $17^{1/2}$-inch hole being drilled to 282m. A closed mud system was used to drill this interval. Native clays assisted in maintaining favourable rheology together with the addition of water to maintain volume.

Funnel viscosity dropped from 62sec/qt down to 42sec/qt while drilling the first 30m of the top hole section and increased back to 50sec/qt while drilling in the top hole clays.

The top hole lithology changed from clays to an increasing amount of siltstone after 60m. This change, together with water additions to maintain sufficient surface volume, caused the funnel viscosity to drop below 40sec/qt.

Lime was added to increase and maintain funnel viscosity while drilling the Moolayember Formation (top 49m). The mud weight was allowed to increase to 9.2ppg utilising formation clays and by being controlled by the continual use of the desilter and desander. The use of both these units indicated satisfactory efficiencies while drilling through the Moolayember silts with outputs of 14.2 and 14.3ppg, respectively.

Some carbonaceous material was drilled before entering the Clematis Sandstone at 273m. However, this had little effect on viscosity or pH due to insufficient quantity of the material.

Upon reaching the interval TD at 282m just after entering the Clematis Sandstone, a wiper trip was run and no fill was encountered when returning to the bottom of the hole.

Casing was set at 282m and cemented to surface with a 15.6ppg slurry which was displaced with water.

Interval
282 - 1,704 metres ($12^{1/4}$-inch hole)

Before drilling this interval 280bbls of spud mud was saved from the previous interval and the mud tanks were cleaned out. The spud mud was placed in the two, 140bbl suction tanks and the remaining tanks were filled with fresh water.

A $12^{1/4}$-inch bit and BHA was made up and run down the hole to tag the cement at 262m. The cement, collar and shoe were drilled out using water. Drilling continued for another 3m past the casing shoe at 285m where a Formation Integrity Test (FIT) was performed. Drilling continued again after this test was concluded using spud mud made up to maintain volume.

The original plan for drilling this interval included the use of a Polyacrylamide/Sodium Chloride (PHPA/NaCl) mud system. The sodium chloride (salt) was not on site when the drilling of this interval began. Instead a straight line PHPA mud system was used to drill the hole until the salt arrived on location. The well was at a depth of 1,030m when the salt arrived.

The first bit change in this interval occurred at 615m after 25.5 hours of drilling through the Clematis Sandstone and on into the Rewan Formation.

Cement contamination was treated continually with sodium bicarbonate additions. When the first bit change occurred the pH has reduced from an initial 10.5 at the beginning of the interval to 9.0. Hardness was reduced to 40ppm as a result of sufficient sodium bicarbonate addition.

Whilst waiting for the salt the water loss was reduced to 8cc to minimise clays as much as possible. The natural chloride level of the mixwater was 800ppm and this was aided somewhat by the formation waters to give a mud chloride level of about 1,000ppm.

Gradual additions of JK-261 polyacrylamide reached in excess of 1.5ppb by the time the well was at 1,000m Rheological parameters were also aided with additions of polysaccharide (Drispac).

The second bit change in this interval occurred at 979m while in the top of the Jochmus Formation. It was at this point that the absence of salt and the mud weight were to be significant.

The caving of coal from the Bandanna Formation made it necessary to wash and ream extensively in order to keep the drill string free. After the bit change and the continuation of drilling the mud weight was increased from 8.8-9.2ppg. This increase was achieved by adding barite which provided sufficient hole stability to inhibit the coal from caving in.

The supply of salt arrived on location when the well was at 1,000m. Salt was then immediately added to the mud system by mixing batches of 50bbls of mud with 10 sax (5kg each) of salt at a time, and blending these batches with the active mud system. This procedure continued until the chloride level reached 10,000ppm.

A carbide test was run at 1,070m indicating that the hole was only 5% over gauge. A wiper trip was conducted shortly after this test from 1,078m to the $13^{3/8}$-inch casing shoe. The hole was shown to be tight over the interval 979-864m. On resuming drilling it was necessary to wash and ream the last 21m to bottom. Generally, however, the hole was in much better condition than it was for the bit change at 979m.

Drilling continued in the Permian sediments of the Jochmus Formation. The mud showed favourable stability with PHPA levels maintained above 1.3ppb and chloride at 10,000ppm or a little better. The funnel viscosity varied little from 41-46 sec/qt while the plastic viscosity ranged between 10-12 and the yield point from 22-26 lb/ft^2.

All solids removal equipment ran continuously while drilling. Discharges from the centrifuge were consistently in excess of 14ppb. Desander discharges were also in excess of 14ppb and desilter discharges were between 11-12ppb depending on the lithology encountered.

Mix water for premixes was taken from the sump after drilling 1,200m. These waters already contained some level of both PHPA and chloride. Such utilisation proves to be very economic in comparison to using fresh make up water with little chloride level and PHPA.

The third bit change for the interval was run at 1,357m, The mud weight was maintained at 9.3ppg from 1,050m and proved to give sufficient hydrostatic control over wellbore cavings.

There were no tight spots in the wellbore while changing the bit and drilling continued on through the Early Permian sediments of the Jochmus Formation (Unit-C top at 1,316m).

A mud pH no higher than 8.5 was maintained to give the long chain polymers of the PHPA system an ideal hydroxyl ion level for the system to operate. The lower pH threshold was also reflected in the mud alkalinity (Pm) levels which did not rise above 0.1 for the remainder of the interval drilled.

Additions of low viscosity Sodium Carboxymethyl Cellulose (CMC-LV) helped control the filtrate. These additions were used in preference to medium viscosity CMC or Polyanionic Cellulose (PAC) which would have given funnel viscosities and yield points far greater than those prognosed. This in turn would have created the undesirable possibility of capturing air in the drilling fluid.

The presence of siliceous siltstones slowed the drilling of the lower part of this interval. Bit #5 was changed out at 1,611m and had a TBG of 5-7-I. At the time of this bit change the stabilizer was replaced. It had been in the BHA since 614m and after 997m of use it was $2^{1/}$4-inch out of gauge. This indicated that the sediments in this interval were abrasive.

PHPA levels of 1.5ppb were maintained while drilling the remainder of the $12^{1/4}$-inch hole. This provided the mud with excellent rheological properties and water loss values.

About 24 hours before reaching the interval TD, a sodium sulphite was added to the drilling fluid to give SO_3^- levels of 100-200ppm. The sole function of the sodium sulphite was to act as an oxygen scavenger which would reduce the corrosion of the casing in the well.

Solids retort tests were carried out in this interval from 1,469m to the interval TD. The solids levels were consistently at about 5% with minor traces of light oil.

Bit #6 (1,611-1,703m) was the last bit used to drill this interval and it drilled slowly. Tight hole was not present in this final run and the wellbore was in good condition. A 10 stand wiper trip was run at interval TD and a 40bbl high viscosity pill was spotted on bottom. This pill was made up of 50bbl of system mud with the addition of a 1/4 sack of PHPA to give a funnel viscosity of just over 60sec/qt.

Halliburton wireline logs were run with two runs consisting of the:

DLL-MSFL-BHS-GR-SP-CAL
and the
SLDT-CNT-GR

The caliper logs showed that the hole was oval-shaped and smooth with a dimension of $12^{1/4}$ and up to 14-inch for most of this section. A wiper trip was not necessary before carrying out the first test in a programme of DST's as the hole remained in good condition.

Baker Tools completed three DST's: two in the Jochmus Formation and one in the Bandanna over the following intervals:

DST #1	1,296 - 1,310m
DST #2	1,208 - 1,219m
DST #3	918 - 929m

All tests were carried out using inflatable DST packers which seated successfully on all three occasions. There were no shows of hydrocarbons in any of the tests. A weak blow was recorded during the first test, no return to surface occurred during the second test, and a strong continuous blow was present during the third test. Subsequently, the charts for DST #2 showed that the test was a misrun as the tool had not opened properly.

A wiper trip was run in between DST #1 and #2 with a mud circulation time of one hour. Mud test results indicated that a small amount of formation water had entered the mud system after running DST #1. The results showed that there had been a reduction in the chlorides level from 10,500 to 10,000ppm, a decrease in funnel viscosity from 43 to 41, and a slight increase in filtrate hardness from 200 to 220ppm. At the same time SO_3 levels had dropped through chemical attrition from 100ppm prior to logging and testing to only a trace after running DST #1.

The final two DST's were carried out in one run in the hole, after which samples were recovered and the test tool pulled out.

After laying out the test tools a wiper trip was run to bottom. While circulating, sodium sulphite was added to the mud system to restore the SO_3 levels to in excess of 120ppm. Other mud properties were within the desired parameters with the water loss at 8.8cc, chlorides at 10,000ppm and solids below 5% (by retort).

Casing was then run to 1,700m ($9^{5/8}$-inch + 40ppf) and once in place the mud was circulated for $1^{1/2}$ hours. During the circulation period and also while cementing and displacing, all solids equipment was run to treat any cavings and to ensure that mud remaining at surface as in good condition.

The $9^{5/8}$-inch casing was cemented for the first 610m up from the casing shoe. The mud on final circulation was treated with Surflo B54X at 1 litre per 10bbl of mud. Surflo B54X is a gluteraldehyde (25% w/w) based biocide.

A 40bbl brine-sodium acid pill was pumped as a pre-flush before the cement slurry. Morflo II, a Halliburton isobutanol solution, was also added to the pre-flush at 1 litre per barrel. This caused considerable foaming in the mix tank, but it pumped without a problem. Cementing operations concluded the work in drilling the interval and preparation was then made for drilling the $8^{1/2}$-inch hole.

Interval
1,704 -2,855 metres ($8^{1/2}$-inch hole)
Operational Details

The cement was tagged at 1,680m and drilled with mud. A Formation Integrity Test was conducted at 1,706m (EMW= 17.3lb/gal). Drilling resumed in Jericho Formation and continued with an average ROP of 3.2m/hr. Some foaming was experienced, which caused pressure surges at the rig pumps. However, it was not a major operational difficulty. A bit trip was made at 1,939m. The hole was in good condition during the trip with no excessive overpull or slack off being recorded.

Drilling continued to 2,086m with Bit #8 (Average ROP: 3.2m/hr) and following a drilling break and 0.69 units of gas, it was decided to increase the mud weight to 9.3lb/gal. Barite was used for this purpose.

A five stand wiper trip was made at 2,107m. On running back to bottom, a water influx was taken (permeable sandstones at 2,086-2,088.7m). The mud weight was increased to 9.5lb/gal initially. Later, following a positive flow check at 2,127m, the mud weight was further increased to 9.7lb/gal.

Bit #9 (Average ROP: 2m/hr) was picked up at 2,202m and drilling continued to 2,380m at which point DST #4 was conducted. The hole was drilled to the DST #5 depth of 2,471m using Bit #10 (Average ROP: 2m/hr). DST #6 and #7 were run at 2,490 and 2,595m.

The rest of the drilling was slow and problem free with the average ROP's staying at the range of 1-2.7m/hr. Two bit trips were made at 2,681 and 2,740m, respectively. Bit #15 drilled the $8^{1/2}$-inch hole to the TD at 2,855m.

Wireline logging and a velocity survey were then undertaken without operational difficulty.

Prior to DST # 8, a wiper trip was made to 1,863m. Once again, no hole related difficulty was experienced during the wiper trip.

DST #8 was conducted at 1,760-1,793m interval which was followed by DST #9 at 1,726-1,759m interval. No trip was made in between the DST's, the same inflatable DST tool was used for both of the DST's.

Following the conduct of DST #10 and #11 the Carmichael #1 well was plugged and abandoned.

Mud Details

As the cement and shoe were drilled with the mud the system was contaminated to a degree. Sodium bicarbonate was added into the active system to reduce hardness. Initially all the solids control equipment was operated to assure minimal solids in the mud system. Sodium sulphite was utilised to minimise O_2 corrosion, and SO_3 concentration was maintained at around 100ppm throughout this section.

Initially foaming was a problem and a defoamer was added into the system. However it was not a permanent cure. Commencing from 1,980m additions of CMC-LV and sodium bicarbonate stopped, and the premixes were prepared in drill water rather than the sump water and the foam faded away within 48 hours.

Any new addition into the mud system was made in premix form, which contained: 2lb/bbl Drispac, 1lb/bbl PHPA, 3-4% by weight NaCl, and 0.5lb/bbl Caustic and/or Soda Ash.

The mud weight was maintained at 9.1lb/gal initially, but to prevent an artesian flow, it was progressively increased commencing from 2,086m. The water flow halted temporarily when the mud weight was finally increased to 9.7lb/gal at 2,127m.. However, the well kept flowing on connections occasionally when the circulation was stopped. As a result an increase in water loss was recorded. Additional Drispac was added into the active pits to reduce the water loss, which also helped to maintain the yield point at higher than 25lb/100 sq ft. The hole ceased flowing on connections from 2,260m onwards.

Coal beds were drilled in the 2,202-2,205m interval, but no thinning in rheological properties were recorded.

For the rest of the hole, rate of penetration varied at 2-2.5m/hr and the mud properties remained steady. The Heavy Weight Barite pills, which were pumped prior to the trips, caused some fractional increase in mud weight. However, the mud weight decreased to 9.7lb/gal easily when the centrifuge was in operation for short periods of time.

Minor thinning in rheological properties were observed after DST #6. The weight was patchy and was down to 9.65lb/gal on occasions. The problem was attributed to "barite sagging" and the mud system was treated with Xanpol to provide sufficient gel strengths to suspend the barite. A slight increase in weight was recorded as the siltstone/claystone was drilled between 2,525-2,555m.

When the drilling resumed after DST #7 an offensive smell was noted on bottoms up. This indicated increased bacterial activity under static conditions. Bactericide was added into the system to minimise the problem. Caustic was used and the pH was increased to 9.5 to slow down the degradation process.

The sump water was recycled again from 2,630m onwards and no foaming was experienced. The sump water contained some salt and polymers. Therefore, NaCl and Pac-R additions into the premix were reduced by half to the point of TD.

The system was treated with Pac-R and Bactericide (Surflo B54X) before pulling out at a TD of 2,855m.

Observations and Recommendations
$17^{1/2}$-inch hole

An initial 280bbl gel premix comprising 0.5ppg caustic soda, 0.5ppb bicarbonate of soda, and 20ppb bentonite proved an adequate type of spud mud to begin drilling the top hole. The drilling fluid system was closed from the commencement of drilling, utilising top hole clays during the first 50m to assist mud making.

Mud circulation commenced using only the shale shaker pits and suction tank. Gradually all active and settling pits were included in the circulating system with water additions to maintain volume. After 50m of drilling, the desilter and desander were run continuously to control solids and to maintain a mud weight no higher than 9.2ppg.

Viscosity was maintained in excess of 35sec/qt with lime additions. Maintaining this viscosity or higher proved a little difficult in parts while drilling the Moolayember silts. However, the YP remained in the range 12-14 producing effective hole cleaning.

At the interval TD a high viscosity pill was made up from 50bbl of the active mud to which 1 sack of Drispac was added. This yielded a funnel viscosity of over 100sec/qt and was spotted on bottom before running the $13^{3/8}$-inch casing.

No problems were encountered while drilling or running casing in this interval. Further, as there was no fill on bottom after the pre-casing wiper trip, it may be concluded that the drilling fluid strategy used for drilling this interval was most adequate.

Observations and Recommendations
$12^{1/4}$-inch hole

Mud used to begin drilling this interval had been saved from the previous section. In all 280bbls of spud mud was saved and this proved adequate for commencing the $12^{1/4}$-inch hole.

Cement contamination from the $13^{3/8}$-inch casing was treated successfully with sodium bicarbonate, and after 500m of drilling, the pH had dropped from an initial 11.0 to 9.5 and it continued to fall as drilling progressed. By the time the drilling had reached 975m, the pH was at a desirable level of 8.5 where it was maintained for the remainder of the interval.

The original plan was to drill this interval with a PHPA/salt system was delayed because no salt was on site at the start of the $12^{1/4}$-inch hole. Instead a straight line PHPA system was used to begin with.

As volume was required premixes were transferred to the active system. These were made up as follows:

- 140 bbl mix water
- 1 sack sodium bicarbonate
- 3 sax polyacrylamide

The mud weight was maintained at about 8.8ppg. This straight line, light weight mud system worked well while drilling through the Clematis Sandstone (top 272m), Rewan Formation (top 449m) and Bandanna Formation (top 788m). However, upon intersecting the Jochmus Formation (top 945m) problems were encountered and the inadequacies of the existing straight line PHPA system were exposed.

The problems were encountered when the bit was changed at 979m some 34m into the Jochmus Formation. The hole was tight and extensive working of the drill string was necessary to pull out of the hole for the bit change.

Initially the mud system was weighted up to 9.2ppg with barite once on bottom with the new bit. Shortly after recommencing drilling and after already weighting up to 9.2ppg, the salt arrived on location and was immediately added to the active system until the chloride level reached 10,000ppm.

It is highly recommended in future to ensure that the mud weight be kept at about 9.2ppg upon reaching the Jochmus Formation, and that the chloride level be maintained at a minimum of 10,000ppm to inhibit the Permian clays.

For the remainder of the interval the mud weight was increased slightly to 9.3ppg and the chlorides were maintained at between 10,000-13,000ppm. No further problems were encountered during the drilling operation.

The premix strength was increased slightly after entering the Jochmus Formation to:

- 140 bbl recycled water
- 1 sack sodium bicarbonate (25kg)
- 4 sax polyacrylamide (25kg)

Salt was added by transferring 50bbl of active mud into the pill tank, by adding 48 sax (25kg) of salt and bleeding the same back into the active system.

Casing of the interval occurred without problems. The running of wiper trips during testing, pre-casing, and the wireline logs all showed that the $12^{1/4}$-inch hole was in good condition.

A cement pre-flush made up to pump before the slurry on this interval proved to give excessive foaming problems which overflowed into the active suction pits. This reaction seemed to be caused by reaction between the sodium acid pyrophosphate-brine and a Halliburton isobutanol product, Morflo II. Care should be given when making up this pre-flush in future to allow for excessive foaming, or perhaps, an alcohol-silicon based defoamer such as Defoam should be added to inhibit this reaction.

Observations and Recommendations
$8^{1/2}$-inch hole

Yield Point was maintained at higher than 25lb/100 ft sq from 2,180m to TD. Poly Pac was used for the this purpose, which also helped to reduce the water loss.

Minor quantities of Xanpol was added for the gel strengths to suspend the barytes. Fragile gel strengths were maintained to minimise the hole swabbing and surging during the frequently made bit trips and DST's.

The hole gauge was reasonably good, and no difficulty with hole size was experienced when the DST's were being conducted.

The flow rates were maintained at 250gal/min from 2,471m to TD which was more than sufficient to clean the $8^{1/2}$-inch hole.

Use of the centrifuge proved very beneficial. The mud weight was easily controlled by running the centrifuge for relatively short periods.

In general, the mud performed as expected and the well was drilled without hole problems. The same mud system would be recommended for future wells in the area. However, use of KCl instead of NaCl may be beneficial in terms of achieving a better gauge hole.

The cost of the barite used in drilling the $8^{1/2}$-inch hole was $10,397 which represented 18% of the drilling fluid cost for this section of the well.

See Tables 3 & 4 for a Summary of the Drilling Fluid Properties and Drilling Mud Usage.

4.0 FORMATION EVALUATION

4.1 DRILL CUTTINGS

Samples of drill cuttings were collected at 10m intervals from spud to 600m, and at 3m intervals from 600m to TD. All samples were tagged and described.

Three cuts of washed, dried samples were taken at each sample point. One set was stored in labelled minigrip bags for QDME, and two sets were stored in samplex trays for Maple. The minigrip samples were sent to QDME's Exploration Data Centre, Pineapple Street, Zillmere 4034.

4.2 MUDLOGGING

A Halliburton Mud Logging Unit maintained by qualified personnel was on-site and in continuous operation from spud to total depth. The unit provided 24-hour surveillance of drilling operations including total gas detection, chromatographic gas analysis, lithological description of cuttings, penetration rate and pit level monitoring.

A comprehensive 1:500 scale computerised log was maintained at all times which was available for faxing to Maple-Melbourne and QDME each morning.

All charts were annotated with the depth and attenuation every metre. Gas detectors and chromatographs were calibrated regularly with standard gas blends.

Calcium carbide lag checks were also run regularly and all checks were recorded on the mudlog.

A check of the gas trap and the integrity of the gas hose was carried out at the beginning of each shift. Confirmation of the depth of the hole with the driller's pipe tally was maintained at every connection.

See Enclosure-1 for the Formation Evaluation Log (Mudlog).

4.3 CORING

No cores were cut at the well.

4.4 SIDEWALL CORING

No sidewall cores were shot at the well.

4.5 WIRELINE LOGGING

Halliburton Logging Services completed two wireline logging runs at the well. The logs recorded were:

RUN-1			
Dual Laterolog (DLL)	1,703.4m	to	698.6m
Microspherically Focussed Log (MSFL)	1,703.4m	to	698.6m
Borehole Compensated Sonic Log (BHC)	1,703.4m	to	698.6m
Gamma Ray Log (GR)	1,703.4m	to	3.2m
Compensated Litho-Density Log (LDL)	1,703.4m	to	698.6m
Compensated Neutron Log (CNL)	1,703.4m	to	698.6m
RUN-2			
Dual Laterolog (DLL)	2,852.3m	to	1,698.0m
Microspherically Focussed Log (MSFL)	2,852.3m	to	1,698.0m
Borehole Compensated Sonic Log (BHC)	2,852.3m	to	1,698.0m
Gamma Ray Log (GR)	2,852.3m	to	1,658.0m
Compensated Litho-Density Log (LDL)	2,852.3m	to	1,698.0m
Compensated Neutron Log (CNL)	2,852.3m	to	1,698.0m

The wireline logs were presented at scales of 1:200 and 1:500. The LIS logging format was converted to ASCII for computer analysis.

Prints of the Wireline Logs are included as Appendix-2.

4.6 HYDROCARBON INDICATIONS

A list of the hydrocarbon indications detected whilst drilling the well is tabulated below:

850 - 853m	10-20% dull yellow-white fluorescence, no cut, no crush cut, with a very faint residual ring on crush
855 - 861m	10-20% dull yellow-white fluorescence, no cut, no crush cut, with a very faint residual ring on crush
867 - 871m	Total gas peak of 39 units (7800ppm C1)
882 - 895m	Trace to 10% dull yellow-white fluorescence, no cut, no crush cut, with a trace white residual ring on crush
913 - 916m	Trace fluorescence, no cut, no crush cut with a faint white residual ring on crush
913 - 916m	Total gas peak of 35 units (7000ppm C1)

924 - 928m	Trace fluorescence, no cut, no crush cut, with a faint white residual ring on crush
924 - 928m	Gas peak of 48 units (9400ppm C1)
1,018 - 1,021m	50-70% dull to bright yellow-orange fluorescence, no cut and nil to very slow crush cut with a faint white residual ring on crush
1,275 - 1,278m	Trace bright yellow fluorescence, no cut, streaming to slow crush cut with a trace white residual ring on crush
1,290 - 1,293m	Trace bright yellow fluorescence, no cut, streaming to slow crush cut with a trace white residual ring on crush
1,299 - 1,305m	Trace dull white fluorescence, no cut, with a trace white residual ring on crush
1,506 - 1,509m	Trace dull white fluorescence, slow crush cut, with a trace white residual ring on crush
1,611 - 1,617m	Trace dull white fluorescence, slow crush cut, with a trace white residual on crush
2,289 - 2,295m	Very patchy fluorescence, very slow bluish-white crush cut, with a white residual ring
2,311m	7.2 units total gas (1380ppm C1, 44ppm C2, 13ppm C3, trace C4)
2,352m	20.5 units total gas (3950ppm C1, 150ppm C2, 56ppm C3)
2,352 - 2,358m	Trace dull yellow fluorescence, slow streaming cut, crush cut with a thick, dull white residual ring
2,365 - 2,368m	Trace dull yellow-white fluorescence, slow milky white streaming cut, crush cut with a yellow-white residual ring
2,373m	23.1 units total gas (4460ppm C1, 106ppm C2, 45ppm C3)
2,375 - 2,378m	Patchy fluorescence, slow milky white streaming cut, crush cut with a yellow-white residual ring
2,385m	24 units total gas (4677ppm C1, 172ppm C2, 65ppm C3, trace C4)

2,413m	13.2 units total gas (2365ppm C1, 182ppm C2, 84ppm C3, trace C4)
2,430 - 2,433m	Trace dull yellow fluorescence, no crush cut
2,465 - 2,469m	15-20% blue to light milky white fluorescence, yellow-white slow to moderate streaming cut, crush cut with light yellow-white residual ring
2,466m	30 units total gas (5630ppm C1, 274ppm C2, 64ppm C3, 13ppm iC4, 15ppm nC4)
2,467m	90 units total gas (16778ppm C1, 819ppm C2, 334ppm C3, 27ppm iC4, 34ppm nC4, trace C5)
2,468m	120 units total gas (22349ppm C1, 1092ppm C2, 445ppm C3, 46ppm iC4, 52ppm nC4, trace C5)
2,469m	151 units total gas (28109ppm C1, 1374ppm C2, 560ppm C3, 59ppm iC4, 78ppm nC4, trace C5)
2,485m	76 units total gas (14466ppm C1, 528ppm C2, 206ppm C3)
2,486m	101 units total gas (19243ppm C1, 749ppm C2, 208ppm C3)
2,486m	104 units total gas (19532ppm C1, 1008ppm C2, 260ppm C3)
2,490m	37 units total gas (7085ppm C1, 213ppm C2, 92ppm C3, trace iC4)
2,499m	175 units total gas (33124ppm C1, 1430ppm C2, 364ppm C3, 30ppm iC4, 35ppm nC4)
2,500m	120 units total gas (19312ppm C1, 838ppm C2, 215ppm C3, 22ppm iC4, 28ppm nC4)
2,580m	50 units total gas (9651ppm C1, 334ppm C2, 65ppm C3, 5ppm iC4)
2,582m	172 units total gas (33021ppm C1, 1080ppm C2, 234ppm C3, 24ppm iC4, 30ppm nC4)
2,583m	230 units total gas (44155ppm C1, 1444ppm C2, 313ppm C3, 35ppm iC4, 40ppm nC4)

2,580 - 2,584m	Trace dull yellow-white fluorescence, very slow yellow-white cut, slow crush cut with a thin white residual ring
2,586 - 2,595m	Trace dull yellow fluorescence, very slow milky-white streaming cut, slow yellow-white crush cut with a thin white residual ring
2,594m	162 units total gas (31000ppm C1, 1234ppm C2, 248ppm C3, 21ppm iC4, 24ppm nC4)
2,495m	218 units total gas (42001ppm C1, 1281ppm C2, 338ppm C3, 31ppm iC4, 45ppm nC4)
2,598m	237 units total gas (40500ppm C1, 2304ppm C2, 678ppm C3, 31ppm iC4, 33ppm nC4)
2,604m	124 units total gas (23235ppm C1, 1185ppm C2, 305ppm, C3, 17ppm iC4, 21ppm nC4)
2,610m	116 units total gas (21737ppm C1, 1120ppm C2, 297ppm C3, 15ppm iC4, 118ppm nC4)
2,616 - 2,619m	Very dull fluorescence, very slow milky white streaming cut, slow crush cut with a thin yellow-white residual ring
2,622 - 2,660m	Very dull fluorescence, very slow milky white streaming cut, very slow milky white crush cut with a thin yellow-white residual ring
2,625m	84 units total gas (15681ppm C1, 872ppm C2, 202ppm C3, 16ppm iC4, 18ppm nC4)
2,634m	99 units total gas (17400ppm C1, 880ppm C2, 220ppm C3, 12ppm iC4, 12ppm nC4)
2,686m	26 units total gas (4994ppm C1, 157ppm C2, 40ppm C3, trace iC4)
2,697 - 2,700m	Trace to 5% bright yellow-white fluorescence (pinpoint to spotty), no cut, very slow crush cut with a thick residual ring
2,731m	20 units total gas, 3662ppm C1, 222ppm C2, 88ppm C3, 9ppm iC4, 10ppm nC4)

2,752m	21 units total gas (3920ppm C1, 203ppm C2, 68ppm C3, 2ppm iC4, 3ppm nC4)
2,752 - 2,753m	Trace dull fluorescence, very slow milky white streaming cut, slow crush cut with a thin milky yellow light residual ring
2,753m	30 units total gas (5521ppm C1, 345ppm C2, 104ppm C3, 8ppm iC4, 14ppm nC4)

Computer analysis of the two runs of wireline logs was carried out at the wellsite by Crocker Data Processing. An evaluation of the results confirmed the presence of hydrocarbons in the sequence (see Appendix-3)

4.7 DRILL STEM TESTING

No drill stem testing equipment was on site whilst drilling the $12^{1/4}$-inch hole because it was anticipated that the main zones of interest in the well would be below the $9^{5/8}$-inch casing point at 1,700m. Testing of zones of interest above 1,700m were conducted after the first run of wireline logs when testing equipment was available to conduct these tests.

Four conventional, dual bottom hole drill stem tests and seven, inflate packer tests were carried out at the well for a total of 11 tests (see Appendix-4). Three of the inflate packer tests were carried out in $12^{1/4}$-inch hole with the balance of the tests being conducted in $8^{1/2}$-inch hole.

The test intervals and results were:

DST-1: 1,296 - 1,315m Inflate Straddle

Formation Tested:	Jochmus Formation
Reason for Test:	Wireline log analysis indicated an anomalous zone with moveable hydrocarbons.

The tool opened with a very weak blow which remained steady throughout the 10 minute initial and 26 minute final flow periods. The recovery was 1.6bbl slightly watery mud.

The test was mechanically successful. The DST chart shows low permeability and pressure for the interval tested.

DST-2: 1,208 - 1,219m Inflate Straddle

Formation Tested:	Jochmus Formation
Reason for Test:	Wireline log analysis indicated an anomalous zone with moveable hydrocarbons.

The tool was opened for a 10 minute initial flow period and an 11 minute final flow period. There was no blow in either flow period. The recovery was nil.

The test was a misrun as the chart indicated that the tool blocked immediately on opening.

DST-3: 918 - 929m Inflate Straddle

Formation Tested: Bandanna Formation
Reason for Test: Wireline log analysis indicated an anomalous zone with moveable hydrocarbons.

The tool opened with a strong blow to the bottom of a bucket which continued throughout a single 120 minute flow period. The recovery was 26.6bbls of fresh water with the following properties:

1,100 ppm Cl- or 1,815 ppm NaCl
pH 8.0
Pf 0.01
56 ppm $CaCO_3$
22.4 ppm Calcium.

The DST chart shows moderate permeability and pressure for the interval tested.

DST-4: 2,367 - 2,380.8m Off Bottom Dual Conventional

Formation Tested: Lower Jericho Formation
Reason for Test: A drilling break between 2,371-2,377m with an associated gas peak of 23 units.

The tool opened with a weak blow in the bucket for an initial flow period of 11 minutes which was dead when opening the tool for a final flow period of 15 minutes. The recovery was 4.56m (0.1bbl) of drilling mud.

The test was mechanically successful. The DST chart shows low permeability and pressure for the interval tested.

DST-5 : 2,461 - 2,471m Off Bottom Dual Conventional

Formation Tested: Lake Galilee Sandstone
Reason for Test: A drilling break in the interval 2,461-2,471m with an associated gas peak of 151 units and 15-20% fluorescence.

The tool opened with a weak blow in the bucket for an initial flow period of 13 minutes which was dead when opening the tool for a final flow period of 37 minutes. During the final flow period the tool was rotated 20 turns to check if it was malfunctioning. The recovery was 18.29m (0.5bbl) of drilling mud.

The test was mechanically successful. The DST chart shows low permeability and pressure for the interval tested.

DST-6: 2,478.9 - 2,490.2m Off Bottom Dual Conventional

Formation Tested:	Lake Galilee Sandstone
Reason for Test:	A general increase in rate of penetration associated with two gas peaks of 101 units and 105 units.

The tool opened with a weak blow increasing to $1^{1/2}$ inches in the bucket before slowly decreasing to almost dead toward the end of a single flow period of 36 minutes. The recovery was 15.24m (0.4bbl) of drilling mud.

DST-7: 2,577 - 2,594.5m Off Bottom Dual Conventional

Formation Tested:	Lake Galilee Sandstone
Reason for Test:	Two drilling breaks within the interval 2,579-2,595m associated with 230/218 unit peaks of total gas and trace fluorescence with cut.

The tool opened with a strong blow almost immediately to the bottom of the bucket and remained steady throughout the single test period of 240 minutes. Gas came to surface after 80 minutes at a rate too small to measure and was flared at the blooey line on a 1-inch surface choke. The gas flared as a lazy flame about 2m high which remained constant throughout the remainder of the test period. The recovery was 19.8m (60ft) of slightly gas-cut mud.

The DST chart shows that the interval tested had low permeability and pressure. A closed in period equal to the flow period was not long enough for the buildup pressure to stabilize.

DST-8: 1,758 - 1,791m Inflate Straddle

Formation Tested:	Upper Jericho Formation
Reason for Test:	Wireline log analysis indicated an anomalous zone with moveable hydrocarbons.

The tool was opened and due to extremely poor surface indications the tool was cycled several times to verify that the tool had opened. There was no surface blow at any time. The tool was opened for a single flow period of 54 minutes and was closed for 30 minutes. The recovery was 6m of drilling mud.

DST-9: 1,724 - 1,757m Inflate Straddle

Formation Tested:	Upper Jericho Formation
Reason for Test:	Wireline log analysis indicated an anomalous zone with moveable hydrocarbons.

The tool was opened for a 31 minute single flow period with a weak blow which died after 13 minutes. The shut in period was 29 minutes. The recovery was 6m of drilling mud.

DST-10: 2,717 - 2,735m Inflate Straddle

Formation Tested:	Lake Galilee Sandstone
Reason for Test:	Wireline log analysis indicated an anomalous zone with moveable hydrocarbons.

The tool opened with a weak blow increasing to strong at the bottom of the bucket after 5 minutes. Gas came to surface after 89 minutes and was flared at the blooey line on a 1/2-inch surface choke at a rate too small to measure. The gas flared with lazy flame about 2m high which remained constant throughout the remainder of the test period. The tool remained open for 145 minutes before being shut in for 206 minutes. Liquid recovery at the surface was nil.

DST-11: 2,597 - 2,615m Inflate Straddle

Formation Tested:	Lake Galilee Sandstone
Reason for Test:	Two drilling breaks with associated total gas peaks of: 237 units at 2,598m (C1 to C4) 124 units at 2,604m (C1 to C4) 116 units at 2,610m (C1 to trace C5) Wireline log analysis indicated an anomalous zone with moveable hydrocarbons.

The tool opened against a closed choke with no blow. A trace blow appeared 7 minutes later. The blow was strong 10 minutes after opening the tool. The 1/2-inch choke was opened a minute later with gas to surface. The gas to surface time for this interval is unknown due to the residual gas from DST-10 flaring almost immediately the choke was opened. The gas came to surface at a rate too small to measure and flared with a lazy flame 3m high throughout the duration of the test.

The total liquid recovery was 338m consisting of:

125m of gas-cut mud
126m of gas-cut water
87m of gas-cut watery mud

The chart for DST #11 indicates that the water was recovered during DST #10 and, therefore, the properties of the water recovered should relate to the interval tested by DST #10.

The properties of the water recovered from the sample chamber were analysed as follows:

3,000 ppm Cl^- or 4,950 ppm NaCl
64 ppm total hardness
Pf/Pm = 0/0.82
pH 8
SO_3 Nil

See Appendix-5 for the Gas Analyses.

4.8 ACIDIZING

No acid treatments or frac jobs were done at the well.

4.9 VELOCITY SURVEY

Velocity Data Pty Ltd conducted a 31-level velocity survey at the well and an uphole survey in the water bore adjacent to the well.

Information was recorded in the well at the following geophone depths:

91	291	325	410
458	581	650	734
788	869	945	1066
1199	1260	1313	1389
1460	1519	1641	1712
1808	1956	2102	2216
2276	2344	2465	2535
2614	2752	2850	

Information was recorded in the water bore at the following geophone depths:

5	10	15	20
25	30	35	42.4

50	55	65	75
88.4	95	105	115
125	130.4	145	155
165.4	175	195	215

More information about the Velocity Survey is included in Appendix-6

5.0 GEOLOGY

5.1 GEOLOGICAL OVERVIEW

The Carmichael Prospect is in the Galilee Basin and, more particularly, is situated along the western margin of the Koburra Trough. The Galilee Basin is regarded as an intracratonic basin which contains a sequence of continental, fluvial, and periglacial sediments of Late Carboniferous to Early Triassic age. It overlaps sediments of Devonian age to the east (Drummond Basin) and to the south (Adavale Basin). The Galilee Basin, together with the Cooper and Pedirka Basins formed a major depositional epicratonic complex which was for a time connected with the Bowen, Sydney and Gunnedah foreland basin system (Veevers, 1984).

Deposition of the Galilee Basin sediments commenced after an intense period of uplift, folding and faulting associated with the Kanimblan Orogeny in Mid-Late Carboniferous times.

The oldest rocks preserved in the Galilee Basin are the Late Carboniferous to Early Permian sediments of the Joe Joe Group. All four formations of this group, the Lake Galilee Sandstone, the Jericho Formation, the Jochmus Formation and the Aramac Formation are recognised within the Koburra Trough and progressively overlap the Aramac Trough to the west.

The oldest unit of the Joe Joe Group is a thick basal sandstone, the Lake Galilee Sandstone, which is interbedded with minor amounts of black shale. This unit is interpreted to have been deposited in a fluvio-glacial environment.

The Jericho Formation conformably overlies the Lake Galilee Sandstone and consists of shale and siltstone with subordinate sandstone. A low energy fluvio-lacustrine environment, influenced by glacial conditions and periodic influxes of volcanic detritus, is postulated to have existed during the deposition of this unit.

Sandstones within the Jericho Formation were considered to have good reservoir potential. At the Jericho #1 well core porosities in this unit ranged between 10.7-25.5% with permeabilities up to 169md. At the Bellara #1 well, log porosities ranged from 12-22% with good permeability indicated on the microlog and, at Aramac #1, a sand in this unit flowed water to surface after 30 minutes from a depth of 1,173m.

The Jochmus Formation conformably overlies the Jericho Formation and consists mainly of sandstone with an increasing amount of shale and tuff toward the top of the unit, in particular the Eddie Tuff Member.

The Aramac Coal Measures of late Early Permian age conformably overlies the Jochmus Formation and consists of a fluvio-lacustrine clastic sequence with good reservoir potential in point bar and channel sands contained within the sequence.

In the Late Permian, after a period of regional uplift and erosion, renewed downwarping occurred which resulted in a further deposition of fluvio-lacustrine sediments, the Colinlea Sandstone and the Bandanna Formation.

A sequence of Early to Middle Triassic clastic sedimentation, consisting of the deposition of the Rewan Formation, the Clematis Sandstone and the Moolayember Formation, constitute the final stage of deposition within the Galilee Basin.

See Figure-5 for details of the Generalised Stratigraphy of the Northern Galilee Basin.

5.2 PETROLEUM GEOLOGY

Minor gas shows, oil stain, fluorescence and cut were recorded at numerous stratigraphic levels in wells drilled in the eastern portion of the Galilee Basin. In addition significant hydrocarbon recoveries have been made in the Lake Galilee Sandstone along the western margin of the Koburra Trough.

At Lake Galilee #1, gas (69.4% methane) flowed to surface at a rate too small to measure and 3m of light green oil (43.1^0 API gravity) was recovered from DST-5 (2,645-2,668m) in the upper part of the Lake Galilee Sandstone. DST's 6 and 7 which were conducted at the top of the unit were misruns. An evaluation of the wireline logs indicated that the gross interval between 2,584.7-2,619.8m which included the DST 6 and 7 interval contained 10.7m of untested net pay with an average water saturation of 40%.

Further to the north and along the same trend, gas was flared at Koburra #1 from the blooey line when drilling with air at 2,941m in the lower part of the Lake Galilee Sandstone.

Oil fluorescence, staining, and cut were reported from the Jochmus and Jericho Formations in Jericho #1, Lake Galilee #1, Thunderbolt #1, Bellara #1, and Muttaburra #1.

A sandstone unit some 15m thick in the Jericho Formation at Lake Galilee #1 was not tested at the well. An evaluation indicated that this untested zone contained some 3m of potential pay with 10% porosity and 56% water saturation.

Gas shows associated with the coal measures were common in the Aramac Formation and in the Late Permian coaly sequences.

Neither Lake Galilee #1 nor Koburra #1 appear to have been drilled on a valid closure and technical debate continues about whether the hydrocarbons in the Lake Galilee Sandstone were sourced from sediments of Carboniferous or Devonian age.

Nevertheless, reservoir units at the top of the Lake Galilee Sandstone and within the overlying Jericho Formation were considered as prime targets for hydrocarbon accumulation in this part of the Galilee Basin. The poor intergranular porosity of the potential reservoir units was of concern. However, the extent of fracture porosity was unknown, but if fracturing occurred then considerable enhancement in the development of porosity would result.

The results of the Mogga #1 well drilled by Canso downgraded the prospectivity of the eastern portion of the Koburra Trough. However, across the western hingeline of this trough a thick, relatively undeformed sequence of Galilee/Drummond Basin sediments is present. Hydrocarbon plays along this western hingeline were considered favourable because:

- A small quantity of oil was recovered from the Galilee Sandstone at the Lake Galilee #1 well which was drilled on this trend.
- Gas flowed to surface from the same unit at Koburra #1, also drilled along this trend to the north.
- Structures, unlike that drilled by Mogga #1, could be broad, basement-related features having potentially large volumes.
- The thick Galilee Sandstone was a prime reservoir target having a potential gross pay of several hundred metres.
- Potential structures would have probably been in existence for a long time with their present geometry having been created during the Kanimblan orogeny in Middle Carboniferous times.
- These structures would be largely unaffected by the subsequent Triassic and post-Eromanga tectonism.
- Potential source sequences in the Jericho and the underlying Lake Galilee and Drummond Basin sediments were considered as mature along the western hingeline trend.

- Potential structures along the western hingeline were regarded as be well-placed to receive any hydrocarbons expelled from deeper within the Koburra Trough in the absence of any competing traps downdip.

6.0 PROSPECT SUMMARY

6.1 WELL OBJECTIVES

Carmichael #1 was proposed as an exploration well in ATP-588P and was sited to test the Carmichael Prospect: a large, anticlinal feature at the top of the Lake Galilee Sandstone on the western flank of the Koburra Trough in the Galilee Basin (see Figs-2 & 3).

The primary objective of the well was to test porous and permeable zones at the top and within the Lake Galilee Sandstone of Permo-Carboniferous age.

Secondary objectives included reservoir sands within the overlying Jericho Formation of Early Permian age.

6.2 PLAY DEFINITION / STRUCTURE

The Carmichael Prospect, was delineated by a seismic grid of approximately 3 by 2.5 km, comprising two vintages of seismic data: the oldest, recorded by Canso Resources in 1982, and a more recent infill seismic programme, recorded by Leighton Mining in 1985. The seismic data was of good quality, with primary reflections correlatable to depths in excess of 3.0 seconds (approximately 5,000m).

The Intra Jericho, Near Base Lake Galilee Sandstone, Near Top Drummond, and Intra-Drummond seismic reflection events were identified and correlated across the Carmichael Prospect. Horizon identifications were based on reconnaissance seismic traverses which extended to the Lake Galilee well location, located some 25km to the southwest. Time structure maps were prepared for each of the four horizons at a scale of 1:25,000. Figure-3 shows the Near Base Lake Galilee Sandstone structure map. In preparing the structure maps the older Canso lines were bulk shifted minus 15 msecs so that reflection times measured along these lines would better correspond to reflection times observed on the newer, Leighton Mining, seismic lines.

The mapping showed the Carmichael Prospect to coincide with local closure developed on a simple, northwest plunging nose situated on the edge of the Koburra Trough. The Koburra Trough contains a thick Devonian basinal sequence overlain by the erosionally truncated eastern edges of the Permo-Triassic Galilee and Jurassic-Cretaceous Eromanga basins. Essentially a symmetrical anticline, the Carmichael Prospect showed no major faulting, although minor crestal faulting was indicated on dip lines C85-1, 3 and 5.

Structural closure was mapped at each of the four horizon levels, the magnitude of vertical closure increasing with depth. Closure was essentially provided by compactional drape over a paleo-high, although there might have been some structural reactivation, prior to deposition of the Lake Galilee Sandstone. The crest of the anticline showed two sub-culminations, that to the southeast being the more structurally prone (see Fig-2).

Critical vertical closure was controlled by structural opening to the southeast, the spill point being estimated from the highest reflection times recorded along Line C85-1 between the intersections of Lines C85-2 and C85-4. At the key reservoir Lake Galilee Sandstone level critical spill point at 1,630 msec was indicated, giving an estimated maximum vertical relief of 22 msec (110 ft), and an areal closure of 26.8 sq km.

At the Near Base Jericho level critical spill point of 1,280 msec was indicated for the southern sub-culmination, giving a maximum vertical relief of 15 ft, and an areal closure of 3.0 sq km. A separate closure was associated with the northwestern sub-culmination which had a maximum vertical relief of 20 ft and a closure of 3.2 sq km.

Based on seismic velocities at the Lake Galilee well location, a well drilled on either the northern or southern sub-culmination to a depth of approximately 3,100 m was considered sufficient to test the entire Lake Galilee Sandstone unit.

7.0 WELL RESULTS

7.1 LITHOLOGY AND STRATIGRAPHY

The sedimentary sequence present in the Carmichael #1 well is shown in detail on Table-5. The ages of all the formations penetrated are based on determinations previously made from the Lake Galilee #1 and Koburra #1 wells.

A Compressed Gamma Ray-Sonis Log (scale 1:5,000) is included as Enclosure-2 which clearly depicts the log response of the formations penetrated in the well.

Surface Clay

Interval: 0-49m
Thickness: 49m
Age: Recent

This interval consists mainly of claystone with minor sandstone near the top of the unit.

The claystone is light grey to dark yellow orange, occasionally dark grey, very soft to soft, amorphous, non-calcareous with trace to common silt grains. Toward the base of the unit, the claystone changes colour to green grey, occasionally very light grey and sticky with a trace of glauconite.

The sandstone is colourless, off white, very light grey, fine to medium grained, moderate to well sorted, subangular to subrounded, with a weak cement and an argillaceous matrix. Visual porosity is rated as fair to good.

Moolayember Formation

Interval:	49-270m
Thickness:	221m
Age:	Early Triassic

The Moolayember Formation consists of an interbedded sequence of sandstone and siltstone.

The top of the unit is taken from the ROP log where there is a change in the lithology.

The sandstone is clear to translucent, light grey to light greenish grey, medium light grey, and brownish grey, very fine to medium grained, occasionally coarse, angular to rounded, well sorted, with calcareous or siliceous cement in places, and with traces of glauconite and mica in beds toward the base of the unit. The visual porosity ranges from poor to good.

The siltstone is very light grey to medium grey, dark greenish grey to brownish grey, hard to very hard, subfissile to fissile, firm, sub-blocky, occasionally arenaceous, in part laminated with traces of mica and carbonaceous material.

Clematis Sandstone

Interval:	270-449m
Thickness:	180m
Age:	Early Triassic

The Clematis Sandstone is predominantly a sandstone unit with minor interbeds of siltstone and claystone. A small amount of tuff was logged in the middle part of the unit.

The top of the unit corresponds with a marked decrease in the response of the gamma ray log.

The sandstone is clear to translucent, white to very light grey, off white, in places red-brown to reddish grey and white to multicoloured, very fine to medium grained, occasionally very coarse, angular to subrounded, well sorted, dominantly with loose quartz, moderately hard, occasionally with calcareous and siliceous cement, and traces of mica, argillaceous material, and chlorite. The visual porosity ranges from poor to good.

The siltstone is dark reddish-brown, greyish yellow, pale green to greyish green, occasionally dark grey, firm to moderately hard, sub-blocky to subfissile, non-calcareous, in part with abundant hematite/limonite at the level of the tuffaceous material.

The claystone is moderate red-brown, brown, soft to firm, amorphous, occasionally subfissile, non-calcareous, slightly dispersive, in part grading to shale.

The tuffaceous material is white to cream, occasionally greyish-yellow, firm to hard, sub-blocky, splintery, very fine to cryptocrystalline matrix, rare oxide staining, brittle in part.

Rewan Formation

Interval:	449-788m
Thickness:	339m
Age:	Early Triassic

The Rewan Formation is a thinly interbedded sequence of sandstone, siltstone and claystone.

The top of the unit is picked at the base of a well-developed sandstone where the gamma ray increases markedly and there is a corresponding increase in sonic Δt.

The sandstone is clear-translucent, off white, light grey to white to greenish grey, greyish blue-green, generally very fine to medium grained, occasionally coarse to very coarse loose quartz, angular to subrounded, with traces of chlorite and lithics. The visual porosity is generally poor.

The siltstone is pale green, light and dark greenish grey, firm to moderately hard, sub-blocky to blocky, occasionally subfissile and micromicaceous, in part with an arenaceous matrix, rarely argillaceous and a trace of chlorite.

The claystone is light to dark greenish grey, light bluish grey, light grey, white, rarely reddish brown, soft to firm, sticky, amorphous to firm, crumbly to sub-blocky, and non-calcareous.

Bandanna Formation/Colinlea Sandstone

Interval: 788-945m
Thickness: 157m
Age: Late Permian

The Bandanna Formation consists of an interbedded sequence of sandstone, siltstone, shale, claystone and coal with very minor tuff.. The unit contains seven coal seams with the largest being about 15m thick. A sample of coal taken at 801m recorded a vitrinite reflectance (Rv) of 0.58.

The top of the unit is selected where coal is first indicated and, at this depth, there is a sharp kick on the density, neutron and sonic logs.

The sandstone is clear-translucent, very light grey to white, very fine to coarse grained, occasionally very coarse, angular to subrounded, loose to hard, moderately sorted, with calcareous and siliceous cement, in part with an argillaceous matrix, and traces of chlorite, lithics and micromica. The visual porosity ranges from poor to fair. The computer derived porosity (PHIE) of the sandstone bed in the middle of the unit is as high as 33%.

The siltstone is light to dark grey, grey-brown, firm to moderately hard, sub-blocky to subfissile, occasionally with carbonaceous fragments, and non-calcareous with traces of micromica and chlorite.

The shale is black, hard, subfissile to fissile, micromicaceous, very carbonaceous, and in part grading to coal.

The claystone is light brown, very light grey, off white, buff, waxy, soft to moderately firm, crumbly to sub-blocky, in part moderately calcareous and grading to shale.

The coal is brownish black, greyish black, earthy to subvitreous, firm to hard, sub-blocky to subfissile with a conchoidal fracture.

The tuff is cream to white, hard, brittle, cryptocrystalline, in part silty with common microlamina.

The intervals 850-853m and 855-861m reported 10-20% dull yellow-white fluorescence, no cut, no crush cut, but left a very faint residual ring on crush. Samples in the interval 882-895m gave a trace to 10% dull yellow-white fluorescence, no cut, no crush cut, but a trace of a white residual ring on crush.

Three gas peaks were recorded adjacent to coal seams as follows: 867-871m (39 units TG), 913-916m (35 units TG), and 924-928m (48 units TG).

Jochmus Formation
Upper Section

Interval:	945-1,232m
Thickness:	287m
Age:	Early Permian

The Upper Section of the Jochmus Formation consists of an interbedded sandstone, siltstone and claystone sequence with a very occasional thin bed of tuff.

The top of the unit is picked at the base of a resistivity peak which corresponds to the base of the basal sand in the Colinlea. The "shale" content (Vsh) of the sandstones immediately below the top of the Upper Jochmus increases markedly when compared with the basal Colinlea sand.

The sandstone is clear, white, off white, very light grey to light grey, occasionally translucent, very fine to coarse grained, firm to hard, poor to moderately sorted, subangular to subrounded, moderately to strongly cemented with silica, occasionally with a calcareous cement and an argillaceous matrix, often with carbonaceous, chloritic and lithic fragments. The visual porosity is rated as poor. The computer derived porosity (PHIE) is generally less than 10% throughout the unit, except for the following intervals where porosity was better developed:

989.8 - 993.5m	10.4% - 15.9%
1,014.8 - 1,017.9m	10.1% - 14.3%
1,052.6 - 1,066.0m	11.7% - 16.2%
1,202.6 - 1,220.3m	10.2% - 22.1%
1,222.7 - 1,231.2m	12.7% - 17.2%

The siltstone is very light to medium grey, pale blue-green to greenish grey, olive grey to olive black, dark greenish grey, occasionally pale orange, firm to very hard, sub-blocky to blocky, non-calcareous, rarely subfissile, in part finely laminated, occasionally with a siliceous matrix, and in part also consisting of traces of chlorite, disseminated pyrite, mica, carbonaceous streaks and quartz micro-veining.

The claystone is white, off white, very light grey, in places olive grey to dark yellowish brown, very soft to soft, amorphous to sub-blocky, slightly calcareous, commonly kaolinitic and occasionally with an arenaceous matrix.

The tuffaceous material is white, cream, very light grey, occasionally orange to reddish brown, hard to very hard, with a cryptocrystalline texture and a siliceous matrix, splintery to sub-blocky, and traces of hydrothermally altered minerals (chlorite, epidote, silica).

The interval 1,018-1,021m was logged with 50-70% dull to bright yellow-orange fluorescence, no cut and nil to very slow crush cut with a faint white residual ring on crush.

Edie Tuff Member

Interval:	1,232-1,357m
Thickness:	125m
Age:	Early Permian

The Edie Tuff Member consists of an interbedded sequence of sandstone, siltstone, claystone and tuff.

The top of the Edie Tuff corresponds with a marked decrease in the gamma ray and resistivity logs, and sharp increase in sonic Δt.

The sandstone is clear-translucent, very light grey to off white, occasionally pale orange, mainly very fine to fine grained, subangular to subrounded, poorly to moderately sorted, commonly with a white argillaceous matrix, siliceous cement with rare orange-reddish brown staining, rare lithics, a trace of carbonaceous fragments and poor visual porosity. The computer derived porosities (PHIE) of the more porous intervals in this unit are listed as follows:

1,259.9 - 1,267.8m	10.1% - 18.7%
1,275.7 - 1,288.5m	12.2% - 18.4%
1,295.9 - 1,312.2m	11.0% - 21.9%
1,335.3 - 1,340.8m	7.4% - 15.9%

The siltstone is light olive grey to greenish grey, occasionally orange, in part with a siliceous matrix, firm to very hard, and sub-blocky to blocky,

The claystone is light grey to greyish orange, soft, sticky, also firm to hard, amorphous to sub-blocky, and strongly dispersive with an arenaceous matrix.

The tuff is light greenish grey to mëdium grey light grey to white, cream to white, splintery to sub-blocky, hard to very hard with a cryptocrystalline matrix, a trace of carbonaceous microlamina, a trace of reddish orange dispersed mineral. The tuff is in part altered to a soft, white clay.

A trace of bright yellow and dull white fluorescence with no cut, but with slow to steaming crush cut leaving a trace of a white residual ring on crush were noted over four intervals whilst drilling through this unit.

Jochmus Formation
Lower Section

Interval:	1,357-1,698m
Thickness:	341m
Age:	Early Permian

The Lower Section of the Jochmus Formation consists of an interbedded sequence of sandstone, siltstone, and claystone with traces of coal.

The top of the unit is taken where there is a decrease in the response of the gamma ray, an increase in resistivity, and a decrease in sonic Δt.

The sandstone is clear-translucent, very light grey to light grey, off white, occasionally pinkish grey and greyish orange-pink, very fine to fine grained, in places medium grained, subangular to subrounded, firm to hard with poor to moderate sorting, a siliceous cement, an argillaceous matrix, with traces of mica, carbonaceous and lithic fragments. The visual porosity was rated as poor. The computer derived porosities (PHIE) of the more significant intervals in this unit are listed as follows:-

1,357.9 - 1,367.6m	6.1% - 16.8%
1,398.7 - 1,404.2m	9.8% - 16.0%
1,414.6 - 1,424.9m	10.9% - 16.9%

The siltstone is medium light grey to light brownish grey, medium dark grey to dark grey, greenish grey, firm to very hard, sub-blocky to blocky, micromicaceous, in part grading to shale, and occasionally with a trace of carbonaceous flecks and rare microlaminations.

The claystone is very light grey to light grey, greyish orange, off white, very soft to soft, dispersive in part, amorphous to sub-blocky with an arenaceous matrix in part.

The coal is black, hard, brittle, subvitreous to vitreous, in part blocky to subfissile, in part silty, and with a conchoidal fracture.

Two intervals in this unit (1,506-1,509m and 1,611-1,617m) recorded a trace of dull white fluorescence with a slow crush cut which left a trace of a white residual ring after crush.

Jericho Formation
Upper Section

Interval:	1,698-1,898m
Thickness:	200m
Age:	Late Carboniferous to Early Permian

The Upper Section of the Jericho Formation consists of an interbedded sequence of sandstone, siltstone, and claystone with a few thin seams of coal at the top of the unit.

The top of the Upper Section corresponds with an increase in the response of the gamma ray.

The sandstone is very light grey to light grey, off white, occasionally greyish orange-pink, firm to hard, very fine to medium grained with poor to moderate sorting, angular to subrounded, with a siliceous cement, rarely argillaceous and with traces of carbonaceous and calcareous fragments. The visual porosity was poor. The computer derived porosities (PHIE) of the more porous intervals in this unit are listed as follows:-

1,732.6 - 1,736.6m	10.8% - 17.5%
1,739.3 - 1,742.1m	10.1% - 16.9%
1,746.4 - 1,748.5m	10.3% - 18.8%
1,760.4 - 1,765.2m	10.6% - 16.5%
1,769.2 - 1,772.9m	11.7% - 17.7%
1,784.5 - 1,789.9m	10.0% - 16.3%
1,849.1 - 1,852.1m	10.0% - 11.3%

The siltstone is medium light grey to very dark grey, light brownish grey, occasionally light to dark greenish grey and greyish black, firm to very hard, sub-blocky to blocky, dense to massive, with traces of carbonaceous flecks and microlaminations.

The claystone is very light grey to light grey, medium grey to light brown, light brownish grey to cream,, occasionally pinkish grey, soft, sticky, dispersive, amorphous to sub-blocky, and in part with an arenaceous matrix.

The coal is black, hard to brittle, blocky to subfissile, in part silty, with a sub-conchoidal fracture and a sub-vitreous lustre.

No flourescence or cut was noted during the drilling of the Upper Jericho.

Oakleigh Siltstone Member

Interval:	1,898-2,065m
Thickness:	167m
Age:	Late Carboniferous to Early Permian

The Oakleigh Siltstone Member of the Jericho Formation consists of an interbedded sequence of sandstone and siltstone with occasional thin claystone beds.

The top and bottom of this member were picked on the basis of electric log similarities of the same unit as intersected at the Lake Galilee #1 and Koburra #1 wells.

The sandstone is very light grey to light grey, off white, buff to dark yellow, orange light grey, occasionally greyish orange-pink and clear-translucent, fine to medium grained, moderately sorted, subangular to subrounded, firm to hard with silica cement and traces of carbonaceous fragments, an argillaceous matrix and calcareous specks. The visual porosity overall was rated as poor. The intervals with significant computer derived porosity values (PHIE) are listed as follows:-

1,898.3 - 1,900.7m	10.5% - 12.5%
1,912.9 - 1,918.1m	10.0% - 14.5%
2,036.7 - 2,042.8m	10.8% - 13.2%

The siltstone is medium light grey to dark grey, grey to greenish grey, with a dense to massive matrix, firm to hard, occasionally very hard, sub-blocky to subfissile, non-calcareous to slightly calcareous in part, with traces of carbonaceous fragments and specks, and rare microlaminations.

The claystone is light grey to light pinkish grey, soft, sticky, dispersive, in part slightly amorphous to sub-blocky.

No flourescence or cut was noted during the drilling of the Oakleigh Siltstone Member.

Jericho Formation
Lower Section

Interval:	2,065-2,465m
Thickness:	400m
Age:	Late Carboniferous to Early Permian

The lower part of the Jericho Formation consists of an interbedded sequence of sandstone, siltstone and shale with the occasional thin coal seam.

The top of the unit was picked where there is a decrease in the gamma ray, an increase in the resistivity, and a slight increase in sonic Δt.

The sandstone is very light grey to off white, clear-translucent, occasionally greenish grey, brownish grey, very fine to fine grained, subangular to subrounded, sometimes rounded, moderately sorted, firm to hard, with silica cement and an argillaceous matrix, locally calcareous, and with traces of glauconite, carbonaceous specks, rarely micaceous. The visual porosity overall was rated as poor. Intervals within this unit with significant computer derived porosity values (PHIE) are listed as follows:

2,072.5 - 2,080.1m	10.0% - 12.2%
2,082.2 - 2,087.4m	10.2% - 12.9%
2,085.9 - 2,095.7m	10.0% - 15.0%
2,096.9 - 2,100.8m	12.0% - 13.9%
2,210.9 - 2,213.9m	11.2% - 15.0%
2,384.9 - 2,388.3m	9.1% - 13.3%

The interval 2,086-2,089m flowed water to surface on connection at a rate of 9 barrels per hour (1,944 BPD). The mud weight was subsequently increased to contain the water flow.

The siltstone ranges in colour from very light grey to dark grey, dark grey to greyish black, occasionally brown to dark brown, brownish grey, and greensish grey, dense to massive, locally carbonaceous, calcareous, and micromicaeous, firm to hard, sub-blocky to subfissile with rare microlaminations.

The shale is medium to dark grey, brownish grey to greenish grey, greyish black to dark grey, subfissile to fissile, non-calcareous, soft to hard with rare carbonaceous specks.

The coal is dark grey to black, firm to moderately hard, brittle, subvitreous, sub-blocky to subfissile with woody streaks and a conchoidal fracture.

Very minor gas shows up to 24 units of total gas and trace to patchy fluorescence were recorded over a number of intervals during the drilling of the Lower Jericho.

Lake Galilee Sandstone

Interval:	2,465-2,752m
Thickness:	287m
Age:	Late Carboniferous to Early Permian

The Lake Galilee Sandstone consists mainly of sandstone with minor interbeds of siltstone, claystone and shale, and a rare coal seam.

The top of the Lake Galilee Sandstone is easily recognised on the wireline logs where there is a marked decrease in the response of the gamma ray, an sharp increase in the deep resisitivity, and a decrease in the response of the density log.

The sandstone is light white grey to light grey, off white, clear to translucent, fine to medium grained, occasionally coarse grained, subangular to rounded, firm to very hard, moderate to well sorted, commonly with siliceous and calcareous cement, micas and lithics, occasionally with traces of quartz overgrowths. The visual porosity was considered poor. Intervals within this unit with computer derived porosity values (PHIE) of about 5% or more are listed as follows:

2,465.5 - 2,474.7m	5.2% - 9.3%
2,480.2 - 2,482.0m	6.9% - 8.8%
2,482.9 - 2,484.4m	4.5% - 7.9%
2,486.6 - 2,491.1m	5.0% - 10.1%
2,496.9 - 2,500.0m	8.6% - 10.8%
2,580.4 - 2,582.6m	5.3% - 13.6%
2,596.0 - 2,600.2m	5.1% - 9.4%
2,607.9 - 2,609.4m	6.0% - 11.4%
2,631.3 - 2,634.4m	5.3% - 7.5%
2,647.8 - 2,650.2m	4.9% - 5.3%
2,696.3 - 2,700.8m	4.8% - 5.8%

The siltstone is medium grey to dark grey, brownish grey to dark brownish grey, brown to dark brown to brownish black, soft to moderately hard, firm, sub-blocky to sub-platy, occasionally platy, non-calcareous with traces of carbonaceous specks, locally shaley, in part grading to a very fined grained sandstone.

The claystone is very light to medium grey, white to cream, soft, slightly dispersive, massive to sub-blocky, commonly with an arenaceous matrix.

The shale is medium dark grey to greenish black, dark brown to brownish grey, brownish black, moderately hard to hard, splintery, sub-platy to platy, subfissile to fissile, non-calcareous, and locally micaceous and carbonaceous.

The one seam of coal is dark brown to black, moderately hard, subfissile, brittle, sub-bituminous, with a vitreous lustre, a conchoidal fracture and a woody texture.

Numerous shows of oil and gas were noted whilst drilling through the Lake Galilee Sandstone. The more significant of these shows are listed below:

2,465 - 2,469m	15-20% blue to light milky white fluorescence with a yellow-white slow to moderate streaming cut, and a crush cut with a light yellow-white residual ring.
2,467 - 2,469m	90 - 151 units TG
2,486 - 2,487m	101 - 104 units TG
2,499 - 2,500m	120 - 175 units TG
2,582 - 2,583m	172 - 230 units TG
2,594 - 2,598m	163 - 237 units TG
2,604 - 2,610m	116 - 124 units TG

Drummond Sequence

Interval:	2,752-2,855m (TD)
Thickness:	103m
Age:	Devonian

The Drummond sequence drilled at the well consisted predominantly of siltstone, claystone and shale with very minor, thinly interbedded sandstone.

The top of the unit was picked where there is a sharp increase in the response of the gamma ray log, and an equally sharp increase in sonic Δt and the neutron log.

The siltstone is medium grey to dark grey to dark brown, brownish grey to black, dark greensih grey to greyish black, moderately hard, firm, subfissile, sub-blocky to platy, non-calcareous, micromicaceous with carbonaceous specks and traces of calcite in fractures, shaley occasionally grading to very fine sandstone.

The claystone is light to medium grey, medium to brownish grey, oilve grey, soft, sticky, dispersive, massive to sub-blocky, in part with an arenaceous matrix, non-calcareous.

The shale is medium to dark grey to greyish black, hard, brittle, subfissile to fissile, carbonaceous, and in part micromicaceous.

The sandstone is very light grey to light grey, very fine to fine grained, subangular to subrounded, moderately sorted with an argillaceous matrix and siliceous cement, and with a trace of micromica and carbonaceous detritus. The visual porosity was poor.

7.2 RESERVOIR QUALITY

Crocker Data Processing utilised the various wireline logs to determine computer derived porosities (PHIE). Either the gamma ray, neutron log, or a density-neutron combination was used to correct for the "shale" content (Vsh) when deriving PHIE.

The porosity determinations for certain of the intervals tested in the well are listed as follows:

DST #3	918 - 928m	Bandanna
Intervals	918.5 - 920.3m	923.5 - 927.7m
Porosity Range	9.7 - 14.9%	4.8 - 31.7%
Average Porosity	11.8%	16.5%
DST #2	1,208.0 - 1,219.0m	Jochmus
Intervals	1,208.1 - 1,213.6m	1,216 - 1,219.0m
Porosity Range	10.1 - 17.0%	9.7 - 22.1%
Average Porosity	13.6%	14.8%
DST #1	1,296.0 - 1,315.0m	Jochmus
Interval	1,297.1 - 1,312.2m	
Porosity range	11.4 - 21.9%	
Average Porosity	16.5%	
DST #7	2,577.0 - 2,594.5m	Lake Galilee Sandstone
Intervals	2,578.6 - 2,580.7m	2,581.0 - 2,582.6m
Porosity Range	4.1 - 7.6%	7.8 - 13.6%
Average Porosity	5.9%	11.0%
Interval	2,591.1 - 2,593.5m	
Porosity Range	5.2 - 7.6%	
Average Porosity	6.3%	
DST # 11	2,597.0 - 2,615.0m	Lake Galilee Sandstone
Intervals	2,597.2 - 2,600.2m	2,602.4 - 2,604.2m
Porosity Range	5.1 - 9.4%	4.9 - 6.9%
Average Porosity	7.3%	5.7%
Interval	2,607.6 - 2,609.7m	
Porosity Range	4.7 - 11.4%	
Average Porosity	8.9%	
DST # 10	2,717.0 - 2,735.0m	Lake Galilee Sandstone

The computed porosity over this test interval is generally less than 4%

DST #3 in the Bandanna recovered freshwater nearly to surface. The recovery was at the rate of about 319 BWPD. The average porosity of the basal part of the test interval was 16.5%.

The overall reservoir quality of the principal target, the Lake Galilee Sandstone, was poor. There were; however, a few relatively thin intervals where there was an improvement in the porosity.

DST # 7, 10, and 11 in the Lake Galilee Sandstone each flowed gas to surface at a rate too small to measure, indicating low permeability of the test intervals.

7.3 SOURCE ROCK QUALITY

No source rock analyses were undertaken although one sample of coal from the Bandanna Formation was analysed for mean maximum reflectance of telovitrinite (Rv max) with the following result:-

Sample Depth	801m
Rv max (telovitrinite)	0.58
Number of readings	50
Standard deviation	0.05

7.4 TRAP INTEGRITY

The well was a valid test of the mapped structure. The drill tops of all formations penetrated at the well came in higher than predicted from the seismic prior to drilling the well. All the formation tops also drilled high when compared with the Lake Galilee #1 well drilled some 25km to the south-southwest as follows:

Formation	Subsea Difference (m)
Moolayember	4
Clematis	66
Rewan	90
Bandanna	74
Jochmus	113
Eddie Tuff	125
Jericho	119
Lake Galilee Sandstone	112
Drummond sequence	89

The top of the Drummond sequence was much higher than expected, supporting the existence of a paleo-high at early Lake Galilee Sandstone time with early structural growth.

7.5 SHOWS OF HYDROCARBONS AND EVALUATION

The significant indications of hydrocarbons that registered on the gas monitoring devices or were noted whilst logging the samples during the drilling of the well are listed in detail in Section 4.6.

Eleven drill stem tests were conducted at the well which included four, conventional dual bottom hole tests and seven, inflate packer tests.

DST # 7, 10 and 11 in the Lake Galilee Sandstone each flowed gas to surface at a rate too small to measure (See Appendix 4).

A detailed evaluation of the wireline logs is provided in Appendix 3.

7.6 STATIC BOTTOM HOLE TEMPERATURE

The static bottom hole temperature was derived from the temperature data recorded with the wireline logs (see Fig-6). The bottom hole temperature at 2,855m extrapolated from the wireline logging data is 103°C (218°F). The present-day geothermal gradient is 2.74°C/100m or 2.92°C/100m if, respectively, a mean surface temperature of 20°C or 25°C is assumed.

7.7 CONTRIBUTIONS TO GEOLOGICAL KNOWLEDGE

- The Carmichael #1 well was a valid test of the northern sub-culmination of the Carmichael Prospect, and cut the formations as anticipated with the tops coming in higher than predicted.

- Gas shows with minor oil shows of trace to 20% fluourescence were recorded whilst drilling through the Bandanna Formation. A test in this unit, DST #3 (918-929m), recovered 26.6 barrels of freshwater (1,815 ppm NaCl) - equivalent to a flow rate of 319 BWPD.

- The secondary target, the basal part of the Jericho Formation (Lower Jericho), was water-wet. An interval near the top of the Lower Jericho (2,086-2,089m) flowed water to surface on connection at a rate of 9 barrels per hour (1,944 BPD).

- Numerous gas shows with minor oil shows of trace to 20% fluorescence were recorded whilst drilling through the primary target, the Lake Galilee Sandstone. Three intervals flowed gas to surface at rates too small to measure, viz:

DST #7 (2,577-2,594.5m):	Gas to surface (88.76% methane) after 80 minutes which flared with a 2m lazy flame throughout the test period.
DST #11 (2,597-2,615m):	Gas to surface (87.87% methane) after an unknown time, due to residual gas from DST #10 flaring immediately, and continuing with a 2m lazy flame throughout the test period.
DST #10 (2,717-2,735m):	Gas to surface (88.54% methane) after 89 minutes which flared with a 3m lazy flame throughout the test period.

- The Lake Galilee Sandstone was shown to be tight with low porosity, poor permeability and inadequately charged with gas as demonstrated by the low gas productivity from the three DST's conducted in this unit at the well.

- The well, however, did confirm the presence of gas-bearing intervals in the Lake Galilee Sandstone.

- Future exploration potential lies in defining prospective areas where the porosity and permeability of the Lake Galilee Sandstone is enhanced and fully charged with hydrocarbons.

- The coal-bed methane potential of the Bandanna Formation also warrants consideration.

TABLES

CARMICHAEL #1

DAILY OPERATIONAL DETAILS

Day	Date	Drilling	Tripping	Surveys	Circulate Sample	Cond/Circ Mud	Rig/Run Casing	Cement WOC	Rig Service	Test BOP's	Leak-Off Test	Drill Out Shoe	Reaming Tight Hole	BHA	Repairs	DST's	Wireline Logging	Metres Drilled	ROP m/hr
1	25-Apr	7.5		0.5														67	8.9
2	26-Apr	19.0	1.0	1.0		0.5									2.5			214	11.3
3	27-Apr		4.0			2.5	5.5	8.0		4.0								0	0.0
4	28-Apr		2.0							22.0								0	0.0
5	29-Apr	18.5		1.0						1.0	0.5	3.0						285	15.4
6	30-Apr	10.0	4.5			0.5							6.0	1.0	2.0			83	8.3
7	01-May	21.5		0.5	2.0													207	9.6
8	02-May	13.5		1.0	3.0								6.5					122	9.0
9	03-May	10.5	4.0		0.5	6.0			0.5				1.5	1.0				51	4.9
10	04-May	18.5	4.0	0.5	0.5	0.5												72	3.9
11	05-May	23.5		0.5														116	4.9
12	06-May	23.0		1.0														75	3.3
13	07-May	19.0	4.5			0.5												67	3.5
14	08-May	17.5	4.0						1.0						1.5			70	4.0
15	09-May	24.0																64	2.7
16	10-May	23.0		0.5									0.5					68	3.0
17	11-May	18.5	4.5		0.5									0.5				50	2.7
18	12-May	19.5	3.5										0.5		0.5			68	3.5
19	13-May	8.5	4.5	1.0		2.0											8.0	24	2.8
20	14-May		2.5													9.0	12.5	0	0.0
21	15-May		12.5			2.5										9.0		0	0.0
22	16-May		10.0			2.5	5.5		0.5				0.5			5.0		0	0.0
23	17-May						12.0	4.0		5.0					3.0			0	0.0
24	18-May		5.0							16.5				1.5	1.0			0	0.0
25	19-May	18.0		1.0						0.5	1.0	3.5						64	3.6
26	20-May	24.0																71	3.0
27	21-May	23.5		0.5														74	3.1
28	22-May	15.5	5.5			1.0			1.0				1.0					57	3.7
29	23-May	24.0																86	3.6
30	24-May	17.0	0.5	0.5	5.0								1.0					56	3.3
31	25-May	24.0																71	3.0
32	26-May	11.0	10.5										1.0	1.5				25	2.3
33	27-May	24.0																52	2.2
34	28-May	24.0																46	1.9
35	29-May	24.0																45	1.9
36	30-May	14.5	5.0		3.0				0.5							1.0		29	2.0
37	31-May	1.5	18.5						1.0				1.0			2.0		3	2.0

TABLE-1

Day	Date	Drilling	Tripping	Surveys	Circulate Sample	Cond/Circ Mud	Rig/Run Casing	Cement WOC	Rig Service	Test BOP's	Leak-Off Test	Drill Out Shoe	Reaming Tight Hole	BHA	Repairs	DST's	Wireline Logging	Metres Drilled	ROP m/hr
38	01-Jun	24.0																52	2.2
39	02-Jun	15.5	4.5		4.0													37	2.4
40	03-Jun	3.5	13.5						0.5				1.0			5.5		8	2.3
41	04-Jun	3.5	12.5		2.5											5.5		11	3.1
42	05-Jun	18.0	4.0						1.0				1.0					39	2.2
43	06-Jun	24.0																45	1.9
44	07-Jun	9.5	8.0		3.5					1.0						2.0		21	2.2
45	08-Jun	5.5	7.5						1.0				0.5			9.5		16	2.9
46	09-Jun	24.0																40	1.7
47	10-Jun	24.0																30	1.3
48	11-Jun	15.0	7.5										1.5					26	1.7
49	12-Jun	14.0	8.5						1.0						0.5			21	1.5
50	13-Jun	16.0	7.0						0.5				0.5					20	1.3
51	14-Jun	24.0																43	1.8
52	15-Jun	24.0																50	2.1
53	16-Jun	7.5	6.5			2.0											8.0	14	1.9
54	17-Jun		4.0			2.0			1.0								17.0	0	0.0
55	18-Jun		11.5													12.5		0	0.0
56	19-Jun		9.5			2.0			0.5						4.5	7.5		0	0.0
57	20-Jun		9.0											4.5		10.5		0	0.0
58	21-Jun		11.0		0.5			8.5		4.0								0	0.0
59	22-Jun									6.0								0	0.0
	TOT	792.5	235.0	9.5	25.0	24.5	23.0	20.5	10.0	60.0	1.5	6.5	24.0	10.0	15.5	79.0	45.5	2,855	3.6

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TABLE-1
(continued)

CARMICHAEL #1

BIT RECORD

OD & E RIG-32

CASING		RIG EQUIPMENT			
13-3/8"	@ 281.9m	Pump #1	Nat 8P80	Drill Collars	8" & 6 1/2"
9-5/8"	@ 1700.5m	Pump #2	Nat 8P80	Drill Pipe	4.5"
				HWDP	4.5"

RUN #	BIT #	SIZE (in)	MAKE	TYPE	JETS (32nds)	OUT (m)	DRILL (m)	DRILL (hrs)	CUM DRILL (hrs)	ROP (m/hr)	WOB (1000kg)	RPM	VERT DEV	PUMP PRESS (psi)	GPM	VEL DP f/m	VEL DC f/m	MUD WT ppg	VIS s/qt	WATER LOSS ml/30min	BIT CONDITON T	B	G	MUD TYPE
1	1	17.50	SMITH	DSJ	3x18	281.9	281.9	26.5	26.5	10.6	15/35	100	0.50	1025	700	64	71	9.2	39	15.0	3	3	In	Spud mud
2	2	12.25	VAREL	L114	3x16	614.8	332.8	25.5	52.0	13.1	35	110	1.50	925	497	95	140	8.8	39	8.0	8	5	1/4	PHPA/Polymer
3	3	12.25	VAREL	ETD 417	3x16	979.3	364.5	37.5	89.5	9.7	35	110	1.75	1350	497	95	140	9.2	38	7.6	4	4	1/8	NaCl/PHPA/Polymer
4	4	12.25	SMITH	F2	3x16	1,357.5	378.2	94.5	184.0	4.0	40/45	130 100	1.75	2100	415	79	120	9.3	45	7.8	6	4	1/16	NaCl/PHPA/Polymer
5	5	12.25	HUGES	ATJ 22	3x16	1,611.7	254.2	83.0	267.0	3.1	45	100	1.25	2100	403	77	120	9.4	48	8.8	5	7	In	NaCl/PHPA/Polymer
6	6	12.25	HUGES	ATJ22	3x16	1,703.7	92.0	28.0	295.0	3.3	40	100	1.75	2100	474	90	136	9.3	48	8.0	2	2	In	NaCl/PHPA/Polymer
7	7	8.50	VAREL	ETD 517	3x11	1,939.3	235.6	72.5	367.5	3.2	40	75	1.25	1300	281	132	208	9.1	45	7.8	6	4	1/8	NaCl/PHPA/Polymer
8	8	8.50	VAREL	ETD 537	3x11	2,202.0	262.7	81.5	449.0	3.2	40	75	1.50	1500	281	132	208	9.7	50	5.6	8	6	In	NaCl/PHPA/Polymer
9	9	8.50	HTC	ATJ 33	11x11x10	2,380.0	178.0	89.5	538.5	2.0	40	60	1.50	1700	260	126	197	9.7	54	5.6	0	5	In	NaCl/PHPA/Polymer
10	10	8.50	HTC	ATJ 33	11x11x10	2,471.0	91.0	41.0	579.5	2.2	40	60	1.25	1800	280	126	197	9.7	54	5.6	4	1	In	BT NaCl/PHPA/Polymer
11	11	8.50	SMITH	F2	10x10x11	2,490.0	19.0	7.0	586.5	2.7	40	60	1.25	1600	252	120	186	9.7	54	5.6	4	1	In	BT NaCl/PHPA/Polymer
12	12	8.50	SMITH	F3	10x10x11	2,595.0	105.0	51.5	638.0	2.0	40	65	1.00	1650	252	116	186	9.7	61	5.8	6	3	1/16	NaCl/PHPA/Polymer
13	13	8.50	HTC	ATJ33	10x10x11	2,681.0	86.0	59.5	697.5	1.4	45	65	1.00	1600	252	120	186	9.7	62	5.6	7	4	1/8	NaCl/PHPA/Polymer
14	14	8.50	HTC	ATJ44	10x11x11	2,740.0	59.0	59.0	756.5	1.0	45	75/65	1.00	1600	252	120	186	9.7	65	5.0	6	4	In	NaCl/PHPA/Polymer
15	15	8.50	HTC	ATJ44	10x11x11	2,855.0	115.0	61.0	817.5	1.9	45	65	1.00	1600	252	120	186	9.7	66	4.8	4	3	In	NaCl/PHPA/Polymer

TABLE-2

CARMICHAEL #1

SUMMARY OF DRILLING FLUID PROPERTIES

DATE	DEPTH m	HOLE in	MW ppg	VIS	PV	YP	GELS 10s	GELS 0m	WL	SOL (%)	OIL (%)	WATER (%)	SAND (%)	MBC (lb/bbl)	pH	Pf	Mf	Cl- (mg/l)	Ca/Mg (mg/l)	MW (SG)	Remarks	Mud Cost
25-Apr	67	17.50	9	40	-	-	-	-	15.0	5.0	0.0	95.0	TR		9	-	-	1,300	80	1.08	Mudup 280bbl spud mud with 200ppg gel/Drill with closed system	1,062
26-Apr	282		9.2	39	-	-	-	-	15.0	5.0	0.0	95.0	0.25		9	-	-	1,000	110	1.10	Cont drill top hole/Maintain vis with lime/ Run wiper trip	1,280
27-Apr	282		9.2	37	6	14	-	-	15.0	5.0	0.0	95.0	0.25		9	-	-	1,000	110	1.10	Spot 40bbls HiVis/Run csg/Cmt with 15.6ppg slurry/WOC	1,280
28-Apr	282		9.2	36	6	13	-	-	15.0	5.0	0.0	95.0	0.25		9	-	-	1,100	110	1.10	Drill out cmt with mud from abv/Mud up with PHPA	1,280
29-Apr	567	12.25	8.8	39	7	14	3	9	8.0	5.0	0.0	95.0	0.25		9	0	-	1,100	40	1.06	Treat cmt cont with sod bicarb/PHPA premix added when pH~9.5	4,552
30-Apr	650		8.8	38	6	14	3	8	8.0	4.0	0.0	96.0	0.25		9	0	-	1,100	40	1.06	WL red with PHPA & starch additions/Shakers adj to min mud loss	6,077
01-May	822		8.8	39	10	18	4	11	7.6	4.8	0.0	95.2	0.25		9	0	-	950	60	1.06	Cont to inc PHPA to 1.5ppb/Closely monitor MW thru coals	8,769
02-May	979		9.2	38	10	23	4	11	7.6	4.4	0.0	95.6	0.25		9	0	-	950	80	1.10	Allow MW to inc to 9.2 with barite/POOH tight in Bandanna & Rewa	11,617
03-May	1030		9.2	38	11	22	4	11	7.6	4.3	0.0	95.7	0.25		9	0	-	2,000	60	1.10	RIH/Wash & ream 931m to btm/Drill ahead	12,139
04-May	1102		9.3	41	11	22	4	11	8.6	4.2	0.0	95.8	0.25		9	0	-	10,000	100	1.12	Added 10 sx saltwith 50bbl active mud & repeated until 10000ppm	15,407
05-May	1218		9.3	45	11	25	4	12	9.8	4.8	0.0	95.2	0.25		9	0	-	13,000	80	1.12	Maintain WL<10 with CMC-LV additions/Drill ahead	17,209
06-May	1292		9.3	46	12	26	4	12	7.8	4.2	0.0	95.8	0.25		9	0	-	11,000	160	1.12	Make premixes with sump water already containing PHPA + salt	18,966
07-May	1357		9.3	45	11	25	4	11	7.8	4.8	0.0	95.2	0.25		9	0	-	11,000	160	1.12	Circ hole clean at 1358m/Pump hevi-wt pill/POOH for bit change	20,544
08-May	1429		9.3	45	11	25	4	11	7.8	5.1	0.0	94.9	0.25		9	0	-	12,000	120	1.12	RIH with new bit/Drill ahead/Maintain WL<10	22,211
09-May	1493		9.3	46	11	26	4	11	8.2	4.9	1.0	94.1	0.25		9	0	-	10,000	160	1.12	Run retort test/Showed light oil in poss belly, suct & settling pits	23,716
10-May	1561		9.3	46	12	26	4	12	8.2	5.5	1.0	93.5	0.25		9	0	-	13,000	160	1.12	Monitor WL & rheology/Tight hole 1533-38/Work tight spot	25,918
11-May	1611		9.4	47	13	26	4	13	8.4	5.0	2.0	93.0	0.25		8	0	-	12,000	160	1.13	Centrifuge down/Desilter cone prob/Inc mudloss & solids/POOH	27,133
12-May	1679		9.3	48	12	26	4	12	8.4	5.0	2.0	93.0	0.25		8	0	-	12,000	200	1.12	RIH new bit,wash 38' to bott.added sod. sulphite as Oxy Scav	29,349
13-May	1703		9.3	48	12	25	4	12	8.0	5.0	1.0	94.0	0.25		8	0	-	10,500	200	1.12	Condition mud before the logs, W/T, spot Hi-Vis, POOH	30,290
14-May	1703		9.3	43	10	24	4	11	8.2	5.0	1.0	94.0	0.25		8	0	-	10,500	200	1.12	Run Wireline Logs/DST #1: 1296-1315m	30,559
15-May	1703		9.3	41	10	27	4	12	8.6	5.0	1.0	94.0	0.25		8	0	-	10,000	220	1.12	Wat in the mud due to DST#1/ Wiper Trip/ RIH/ Run DST#2	30,559
16-May	1703		9.3	39	10	20	3	10	8.8	4.9	0.9	94.2	0.25		8	0	-	10,000	240	1.12	Run DST#3/Wiper trip/Spot 40bbl Hi-Vis On Bottom.	30,853
17-May	1703		9.3	38	9	19	3	10	8.8	5	0.1	94.9	0.25		8	0.1	-	9,500	240	1.12	RIC/Treat mud with Biocide/ Cement Casing	31,371
18-May	1703	8.5	9.1	44	12	21	4	12	9.0	5.2		94.8	0.25		10	0.6	-	11,000	280	1.09	Tag cem @ 1680m/ Drill out the cement,	32,732
19-May	1767		9.1	44	13	21	3	11	9.2	6		94.0	0.25		10	0.6	-	10,000	320	1.09	FIT=17.3ppg, foam, used Defoamer, Increased SO3 conc.	34,492
20-May	1838		9.1	45	14	27	4	14	8.8	5		95.0	0.25	18.75	9	0.1	-	18,000	100	1.09	Treat cem cont with Bicarb, Drilled in Silts and Sands	37,679
21-May	1912		9.1	44	12	28	4	13	8.0	5.0		95.0	0.25	20	9	0	2	16,000	140	1.09	Treated system with CMC-LV for WL. Maintained SO3 levels	40,080
22-May	1971		9.1	43	11	21	7	11	9.0	4.1		95.9	0.25	10	9	0	1	20,000	152	1.09	Stop additions of CMC and Sod Bicarb to min foam/ Used PAC	41,517
23-May	2056		9.1	46	16	22	7	12	7.1	4.1		95.9	0.25	10	9	0	1	22,000	160	1.09	Drilled ahead, five stand wiper @ 2107m, water flow	43,935
24-May	2113		9.5	52	20	23	6	14	7.0	6.0		94.0	0.25	10	9	0	1	19,000	140	1.14	Inc. M.W. to 9.3 @2088m/Wiper T@ 2107/H2O flow inc MW 9.5	51,755
25-May	2184		9.7	53	22	27	5	13	6.9	6.9		93.1	0.25	10	9	0	1	20,000	160	1.16	H2O flow @2127m/ Inc MW to 9.7/Waterloss reduced to 5.9	54,944
26-May	2209		9.7	50	20	25	4	12	5.6	6.9		93.1	0.25	10	9	0	1	19,000	160	1.16	Bit trip@2203m/coals @2202-2205/No thinning effect	56,316
27-May	2261		9.7	54	22	27	4	13	5.5	6.9		93.1	0.25	10	9	0	1	20,500	160	1.16	Water flow on connect/Waterloss fluctuating/Added PAC.	58,273
28-May	2307		9.7	54	22	29	5	14	5.4	6.9		93.1	0.25	10	9	0	1	21,500	140	1.16	Slow drilling /Steady mud properties	59,903
29-May	2352		9.7	55	22	29	4	13	5.3	6.9		93.1	0.25	10	10	0	1	20,000	160	1.16	Run cent for 5 hours to maintain weight at 9.7ppg	62,266
30-May	2380		9.7	54	23	29	4	14	5.6	7.1		92.9	0.25	10	9	0	1	21,500	120	1.16	POOH for DST#4	62,724
31-May	2384		9.7	54	24	28	4	12	5.6	7.1		92.9	0.25	10	9	0	1	20,000	180	1.16	Run DST #4/POOH/RIH Bit #10/No fill	62,801

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TABLE-3

DATE	DEPTH m	HOLE in	MW ppg	VIS	PV	YP	GELS 10s	GELS 0m	WL	SOL (%)	OIL (%)	WATER (%)	SAND (%)	MBC (lb/bbl)	pH	Pf	Mf	Cl- (mg/l)	Ca/Mg (mg/l)	MW (SG)	Remarks	Mud Cost
01-Jun	2435		9.7	53	24	30	3	12	5.4	7.1		92.9	0.25	8.75	9	0	1	20,000	160	1.16	Drilled ahead, slow drilling steady mud properties	64,573
02-Jun	2471		9.7	54	24	29	4	12	5.5	7.1		92.9	0.25	8.75	9	0	1	20,500	160	1.16	Drilled to 2471m/Circ sample pump pill/POOH for DST	65,490
03-Jun	2479		9.8	52	24	27	4	12	5.6	7.1		92.9	0.25	8.75	9	0	1	20,500	160	1.17	Run DST #5/No difficulty/RIH Bit 11, wash 30m to bot run cent	65,567
04-Jun	2490		9.7	52	24	27	4	12	5.6	7.1		92.9	0.25	8.75	9	0	1	20,500	140	1.16	Drilled to 2490m/ Run DST #6/ No Diff/ POOH	66,084
05-Jun	2529		9.7	49	24	27	4	15	6.0	7.1		92.9	0.25	8.75	9	0	1	20,500	120	1.16	RIH, drilled ahead, rheo. down, treated with PAC, Xanpol,Barytes	70,496
06-Jun	2573		9.7	52	23	30	3	15	6.0	7.1		92.9	0.25	10	9	0	1	20,000	120	1.16	Drilled ahead, inc in mud weight, steady mud properties	72,558
07-Jun	2595		9.7	56	25	32	3	13	5.7	7.1		92.9	0.25	10	9	0	1	21,000	200	1.16	Drilled ahead/CIrc samp @2583 & 2594m/ POOH for DST	73,958
08-Jun	2611		9.8	49	24	28	4	12	7.2	7.3		92.7	0.25	10	9	0	1	21,000	80	1.17	Run DST#7/ Treated system with Biocide/ Inc pH to9.5	77,920
09-Jun	2651		9.7	53	24	28	3	13	6.8	7.3		92.7	0.25	10	10	0	1	21,000	120	1.16	Drilled ahead, commence using sump water, no foam.	80,742
10-Jun	2680		9.7	61	25	32	4	14	5.8	7.3		92.7	0.25	10	10	0	1	22,000	120	1.16	Drilled ahead, used PAC-R for WL/ ROP=1.3m/hr	82,211
11-Jun	2706		9.7	62	25	34	4	14	5.6	7.3		92.7	0.25	10	10	1	2	25,000	120	1.16	Bit trip at 2685m/Reamed 33m to bottom	83,338
12-Jun	2727		9.7	65	25	33	4	14	5.0	7.3		92.7	0.25	10	10	0	2	25,000	100	1.16	Washed out DC @2718m/ Cont to rec sump/ cut down PAC & salt	84,673
13-Jun	2747		9.7	65	25	33	4	14	4.8	7.3		92.7	0.25	10	10	1	2	25,000	80	1.16	Bit change at 2739/Trouble free trip/ Drilled ahead.	84,673
14-Jun	2790		9.7	63	25	31	4	13	5.4	7.3		92.7	0.25	10	10	1	2	25,000	80	1.16	Drilled ahead, steady mud properties.	85,508
15-Jun	2840		9.7	66	25	32	4	15	5.6	7.1		92.9	0.25	10	10	1	2	26,000	80	1.16	Drilled ahead, reduced WL/%Clay in Siltst @ 2790m	88,101
16-Jun	2855		9.7	68	25	32	4	15	4.8	7.3		92.7	0.25	10	10	0	2	26,000	80	1.16	Drilled to TD/ Wiper trip/ Hole OK/ Run Wireline Logs	88,481
17-Jun	2855		9.8	69	26	34	5	15	4.8	7.3		92.7	0.25	10	10	0	2	26,000	80	1.17	Run Logs/Wiper Trip to 1863m/Circ hole before DST's	88,505
18-Jun	2855		9.8	65	26	30	5	13	4.8	7.3		92.7	0.25	10	10	0	2	26,000	80	1.17	POOH/Run DST 8 & 9/ RIH with bit, circulate	88,506
19-Jun	2855		9.8	66	26	31	4	13	5.0	7.3		92.7	0.25	10	10	0	2	26,000	80	1.17	POOH/RIH run DST's	88,610
20-Jun	2855																			0.00	Pump plugs	88,680

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TABLE-3
(continued)

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CARMICHAEL #1

MUD MATERIAL USAGE AND COST

PRODUCT	USAGE	SIZE	UNIT COST	COST ($)	COST (%)	COST ($ p/d)	COST ($ p/m)
445mm (17.50) hole	**Interval =**	**0 - 282m**	**Days =**	**2**			
Gel	80	25kg sx	11.95	956.00	74.69%	478.00	3.39
Drispac	1	50kg sx	142.00	142.00	11.09%	71.00	0.50
Lime	8	25kg sx	9.50	76.00	5.94%	38.00	0.27
Caustic Soda	2	25kg sx	32.00	64.00	5.00%	32.00	0.23
Sodium Bicarbonate	2	25kg sx	21.00	42.00	3.28%	21.00	0.15
				1,280.00	100.00%	640.00	4.54
311mm (12.25) hole	**Interval =**	**282 - 1704m**	**Days =**	**20**			
Polyacrylamide	99	25 kg sx	140.00	13,860.00	46.06%	693.00	9.75
CMC-LV	64	25 kg sx	75.00	4,800.00	15.95%	240.00	3.38
Barite	470	25 kg sx	8.70	4,089.00	13.59%	204.45	2.88
Salt (NaCl)	326	25 kg sx	8.50	2,771.00	9.21%	138.55	1.95
Drispac	18	50 #	142.00	2,556.00	8.49%	127.80	1.80
Sodium Bicarbonate	65	25 kg sx	21.00	1,365.00	4.54%	68.25	0.96
Sodium Sulphite	8	25 kg sx	38.50	308.00	1.02%	15.40	0.22
Surflo-B54X	1	25 kg sx	195.00	195.00	0.65%	9.75	0.14
Caustic Soda	4	25 kg sx	32.00	128.00	0.43%	6.40	0.09
Lime	2	25 kg sx	9.50	19.00	0.06%	0.95	0.01
				30,091.00	100.00%	1,504.55	21.16
216mm (8.50) hole	**Interval =**	**1704-2855m**	**Days =**	**34**			
Drispac	140	50 #	142.00	19,880.00	34.69%	584.71	17.27
PHPA (JK-261)	84	25 kg sx	140.00	11,760.00	20.52%	345.88	10.22
Barite (ID)	1195	25 kg sx	8.70	10,396.50	18.14%	305.78	9.03
Salt (NaCl)	594	25 kg sx	8.50	5,049.00	8.81%	148.50	4.39
Sodium Sulphite	87	25 kg sx	38.50	3,349.50	5.84%	98.51	2.91
CMC-LV	32	25 kg sx	75.00	2,400.00	4.19%	70.59	2.09
Surflo B54X	5	25 lt	195.00	975.00	1.70%	28.68	0.85
Caustic SoDa	28	25 kg sx	32.00	896.00	1.56%	26.35	0.78
Defoamer (L)	8	5 gal	92.50	740.00	1.29%	21.76	0.64
Xanpol (D)	2	25 kg sx	368.00	736.00	1.28%	21.65	0.64
Sodium Bicarbonate	34	25 kg sx	21.00	714.00	1.25%	21.00	0.62
Soda Ash	13	25 kg sx	21.00	273.00	0.48%	8.03	0.24
Calcium Chloride	6	25 kg sx	17.30	103.80	0.18%	3.05	0.09
Gel (ID)	3	25 kg sx	11.95	35.85	0.06%	1.05	0.03
Enerseal	0	25 kg sx	34.20	0.00	0.00%	0.00	0.00
Free Pipe	0	205 lt	650.00	0.00	0.00%	0.00	0.00
High Gel	0	25 kg sx	13.55	0.00	0.00%	0.00	0.00
Kwikseal	0	25 kg sx	42.25	0.00	0.00%	0.00	0.00
Lignosperse	0	25 kg sx	42.00	0.00	0.00%	0.00	0.00
Lime	0	25 kg sx	9.50	0.00	0.00%	0.00	0.00
SAAP	0	25 kg sx	70.00	0.00	0.00%	0.00	0.00
Sodium Nitrate	0	25 kg sx	51.50	0.00	0.00%	0.00	0.00
				57,308.65	100.00%	1,685.55	49.79
TOTALS				**88,679.65**	**100.00%**	**1,583.57**	**31.06**

TABLE-4

CARMICHAEL #1
ACTUAL FORMATION TOPS

FORMATION	SUB-UNIT	CARMICHAEL #1			LAKE GALILEE #1			Carmichael Tops cf Lake Galilee	KOBURRA #1		
		Elev m GL 287.7 KB 293.8			Elev m GL 289 KB 294				Elev m GL 370 KB 375		
		Depth KB	Depth Subsea	Thick-ness	Depth KB	Depth Subsea	Thick-ness	Difference Subsea	Depth KB	Depth Subsea	Thick-ness
Surface Clay		0	294	49	0	294	53	0	0	375	149
Moolyamber		49	245	221	53	240	282	4	149	225	338
Clematis		270	24	180	335	(41)	204	66	488	(113)	331
Rewan		449	(155)	339	539	(246)	323	90	818	(444)	512
Bandanna & Colinlea Sst		788	(494)	157	862	(568)	196	74	1,330	(956)	114
Upper Jochmus		945	(651)	287	1,058	(764)	299	113	1,445	(1,070)	32
	Edie Tuff Mbr	1,232	(938)	125	1,357	(1,063)	118	125	1,477	(1,102)	111
Lower Jochmus		1,357	(1,063)	341	1,475	(1,181)	342	118	1,588	(1,213)	342
Upper Jericho		1,698	(1,404)	200	1,817	(1,523)	219	119	1,930	(1,555)	246
	Oakleigh Sltst Mbr	1,898	(1,604)	167	2,036	(1,742)	154	138	2,176	(1,801)	135
Lower Jericho		2,065	(1,771)	400	2,190	(1,896)	387	125	2,311	(1,936)	423
Lake Galilee Sst		2,465	(2,171)	287	2,577	(2,283)	264	112	2,734	(2,359)	233
Drummond		2,752	(2,458)	103	2,841	(2,547)	565	89	2,967	(2,593)	292
TOTAL DEPTH		2,855	(2,561)		3,406	(3,112)			3,259	(2,885)	

TABLE-5