KAROON
Gas Australia

PEP 162/EL 4537

MEGASCOLIDES-1 RE / ST1

GEOLOGICAL WELL FILE and EVALUATION PROGRAMME

September, 2006

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1. CONTRIBUTORS and CONTROLS

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2. EXECUTIVE SUMMARY & PROPOSAL

Megascolides 1 was the first deep, modern exploration well to be drilled (Dec., 2004) in the EL4537 and PEP162 permits (Fig.1) targeting lower Strzelecki coal deposits for Coal Bed Methane (CBM) exploration and Crayfish Group equivalent alluvial fan sands for conventional oil and gas accumulations that had been interpreted by previous seismic mapping (Blackburn, 2002). The Megascolides 1 well is located 14 km south of Warragul, Victoria on the Northern Terrace of the Narracan Trough, which forms part of the northwestern edge of onshore Gippsland Basin (Fig. 2).

For CBM exploration, the results of the well proved the presence of gas bearing black coal across the Narracan Trough within Wonthaggi Coal Measure (Strzelecki Group) sediments. However, only a total thickness of 15m of black coal in beds less than 0.5m was penetrated. In the one core sample analyzed the gas content was 100SCF per tonne with an approximate gas saturation of 30%. It was therefore considered that a CBM project would be non-commercial at this location and is not the purpose of this re-entry and sidetrack drilling.

With respect to oil and gas exploration, mapping had interpreted that basal Strzelecki Group (Crayfish Group equivalent, probably Rintouls Creek Formation) alluvial fan sands are well developed over the northern and eastern portion of the seismic survey area. It is also interpreted that trap seal integrity would be higher to the north and west where there has been less Tertiary structural deformation.

Megascolides 1 was drilled on a saddle, bounded at the south by a fault identified by seismic mapping at the Top Crayfish Group Equivalent surface (Fig. 3). The well penetrated 3 to 5 metres of net porous, permeable sands with good bright white-yellow fluorescence and high mud gas readings within the Rintoul Creek Fm (Top Crayfish Group equivalent) over the gross interval 1883 to 1891mRT. Petrophysical analysis of the sands show up to 60% oil saturation and a porosity range between 10% and 15%. A core was taken at the base of this interval from 1890 to 1897.27mRT. Geochemical analysis of the extracted oil from a piece of the core shows it to be an unbiodegraded waxy oil. The viscosity and pour point of the oil is unknown. MDT pressures and samples were attempted, however due to hole washouts the tool could not be seated and no data could be collected.

No testing was undertaken due to the unavailability of equipment. The well was subsequently plugged and suspended for later re-entry

It is now proposed the well be re entered, sidetracked and a core cut through the reservoir zone (see details in section 5.5). After drilling sufficient rat hole the well will be logged and if significant hydrocarbon saturations, porosity and permeability are interpreted the well will be open hole drillstem tested.

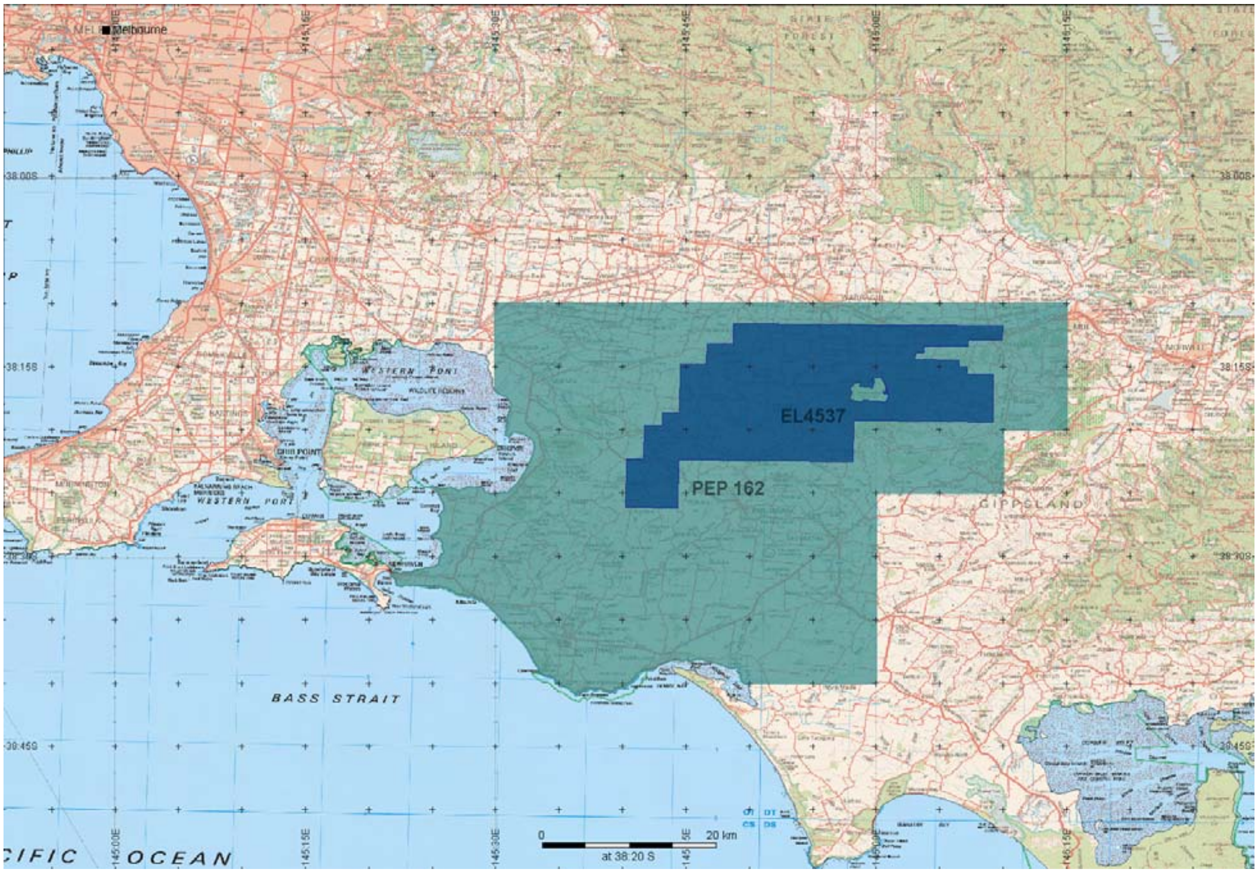

Fig 1 Karoon Gippsland Acreage

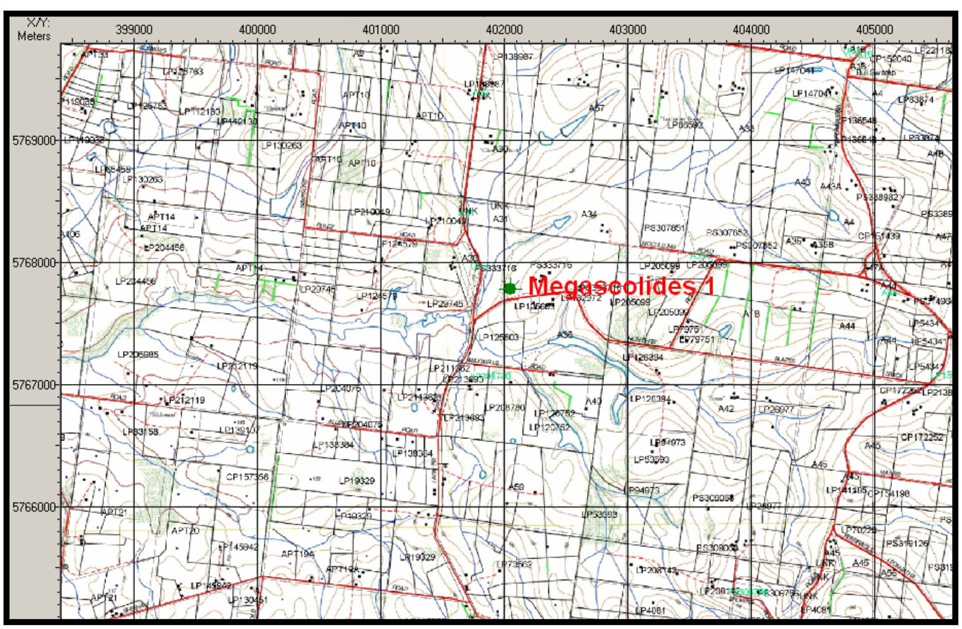

Fig 2 Megascolides-1 Location Map *Megascolides-1 Well Location showing roads (red), streams (blue), farms (bordered in black) and topography (brown).*

3. MEGASCOLIDES-1 SIDETRACK PROGNOSIS

3.1 Megascolides-1 Sidetrack Data Sheet

Name and Address of Operator:

Karoon Gas Pty. Ltd.
ACN 056 976 642
Office 7A
34-38 Lochiel Ave
Mt Martha VIC 3934

Name and Address of Tenement Holder: As above (Karoon Gas through its 100% owned subsidiary Karoon Gas Pty Ltd) hold a 100% registered interest in PEP162/EL4537, within the Western on-shore Gippsland Basin of Victoria.

Well Name:	Megascolides-1 RE/ST1
Well type:	Appraisal
Position:	Onshore
Country:	Australia
State:	Victoria
Basin:	Gippsland Basin, Narracan Trough
Title:	PEP162/EL4537 (The Operations are under PEP 162)
Property Owner:	Wayne Notman
Location:	Intersection of Lardner's Track and Hunters Road
Latitude degrees:	38° 13' 57.5"
Longitude degrees:	145° 52' 50.8"
AMG (Zone 55) E. 402 044.0	N. 5 767765.3
MGA (Zone 55) E. 402 155.9	N. 5 767 949.5

Rig:	Century Rig 11
Rig Type:	Land Rig Rotary Drive
Drilling Contractor:	Century Resources Pty. Ltd.
Expected Spud Date:	Mid November, 2006.
RT-GL	5.2m
GL-MSL	120m
Kick off point, angle and Az.	At 1650mRT, approx.5 degrees maximum angle at azimuth due east of original wellbore
Prognosed top Reservoir	1884.8mRT, at point 20m due East (true bearing) of original wellbore
Total Depth	Approx. 1980mRT
Target Tolerance	Circle with radius of 20m around target

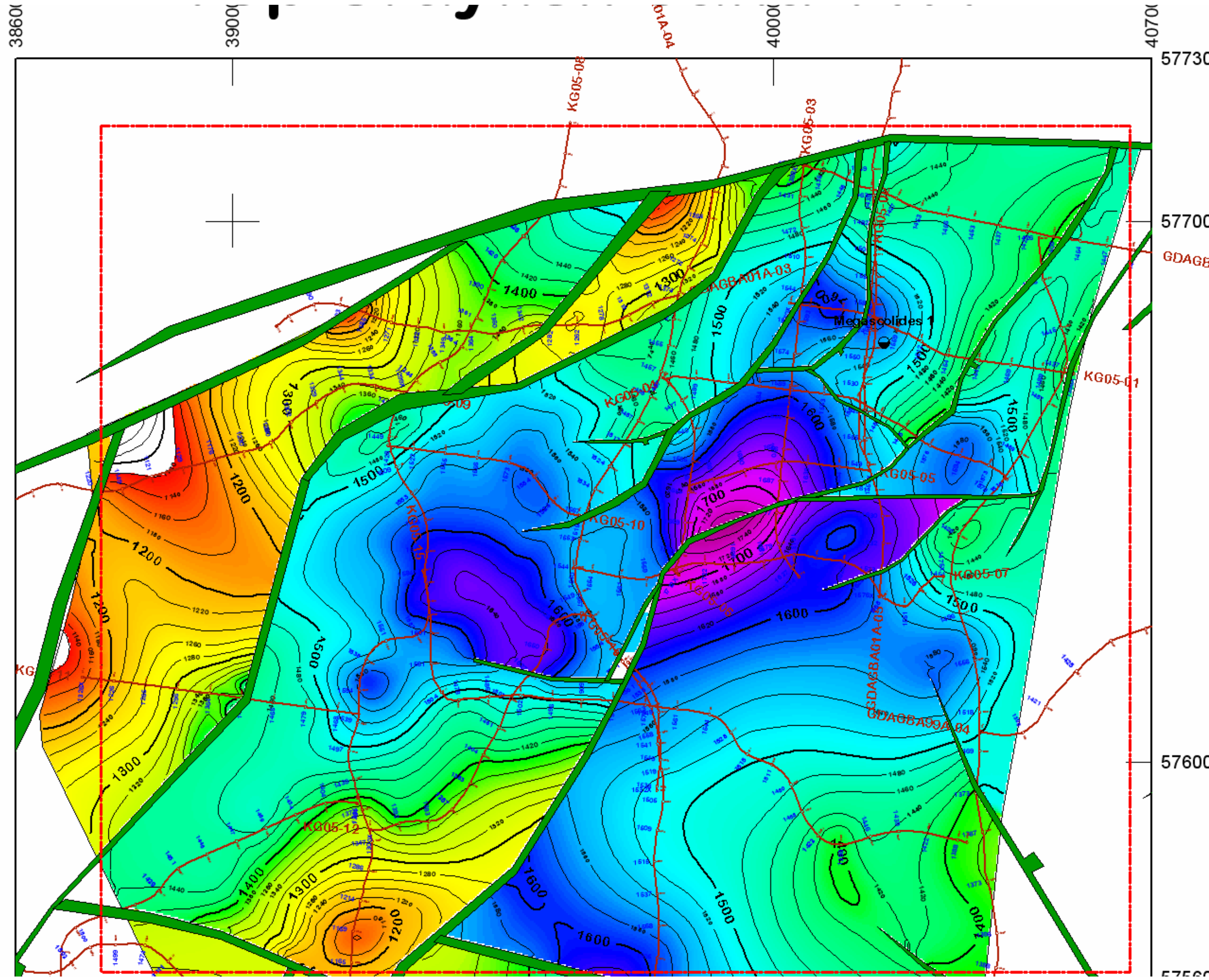

Fig.3 Top Crayfish Equivalent Sandstone (TWT map)

3.2 Megascolides-1 Re-entry & Sidetrack Prognosed Well Stratigraphy

The lithologies and well stratigraphy prognosed to be encountered during re-entry and sidetracking of Megascolides-1 have been based on the Basic and Interpretative Well Completion Reports compiled by Grosser (2005) and the TWT map of Fig.3.

The well is to be sidetracked after setting a cement plug from approximately 1650 to 1740 mMDRT in the Lower Strezlecki Group. It is planned to kick off the sidetrack towards true east at a maximum angle of 5 degrees to a target 20m from the original wellbore at 1884.8mMDRT, the anticipated reservoir level. However, in the event that the original well bore cannot be re-entered or proves unstable and the well needs to be sidetracked from a much shallower depth the expected stratigraphic sequence for the new hole is described below.

Depth measurements are referenced here to the Century Rig 11, which has a rotary table of 5.2m above ground level and 125.2m above mean sea level. Hunt Rig 2 which drilled the original well had a rotary table 4.3 m above ground level (124.3m above mean sea level). All RT depths in this prognosis and during drilling are to be referenced to the Century rig RT.

Megascolides 1 Re-entry & Sidetrack is expected to penetrate a sedimentary sequence which ranges in age from Early to Late Oligocene (Thorpdale Volcanics) at the surface to Early Cretaceous (*F. wonthaggiensis* Zone) near the well total depth of approximately 1980 mMDRT (Table 1). The Volcanics at the base of the well from 1943 mMDRT which may be encountered are postulated to be the Duck Bay Volcanics that mark the onset of rapid extension from the end of the Tithonian to the Early Cretaceous.

Table 1: Megascolides-1, Re-entry & Sidetrack Prognosed Stratigraphy

Formation /unit	Seismic Horizon	Age	TWT sec (Seismic)	Megascolides-1 wireline log pick (mRT)	Megascolides-1 wireline log pick (mTVD SS)	Megascolides-1 Re-entry & ST Prognosed Tops (mMDRT)
Thorpdale Volcanics	Surface	Early to Late Oligocene		4.3 (Hunt Rig RT)	+120 abmsl	5.2 (Century Rig RT)
Barracouta Formation (Childers Formation)	No Pick	Oligocene (?)		38	+86.3 abmsl	38.9
Wonthaggi Formation (Strzelecki Group)	No Pick	Cretaceous		61	+63.3 abmsl	61.9
Intra Strz Sands (Progrades?)	PURPLE		0.923	824	-699.7	824.9
“1200” Unit	GREEN		1.154	1202	-1077.7	1202.9
“1500” Unit	ORANGE		1.297	1502	-1377.7	1502.9
“1800” Unit	KHAKI		1.462	1808	-1683.7	**1809.5**
Rintoul Creek (Reservoir Target)	DARK GREEN (Rintouls is below or equiv to top Crayfish equivalent)		1.548	1883	-1758.7	**1884.8**
Crayfish Group	No Pick			1890	-1765.7m	**1891.8**
Weathered Duck Bay Volcanics	No Pick			1942	-1817.7	**1943.8**
Duck Bay Volcanics (Approx. Total Depth)	No Pick			1962	-1837.7	**1963.8**

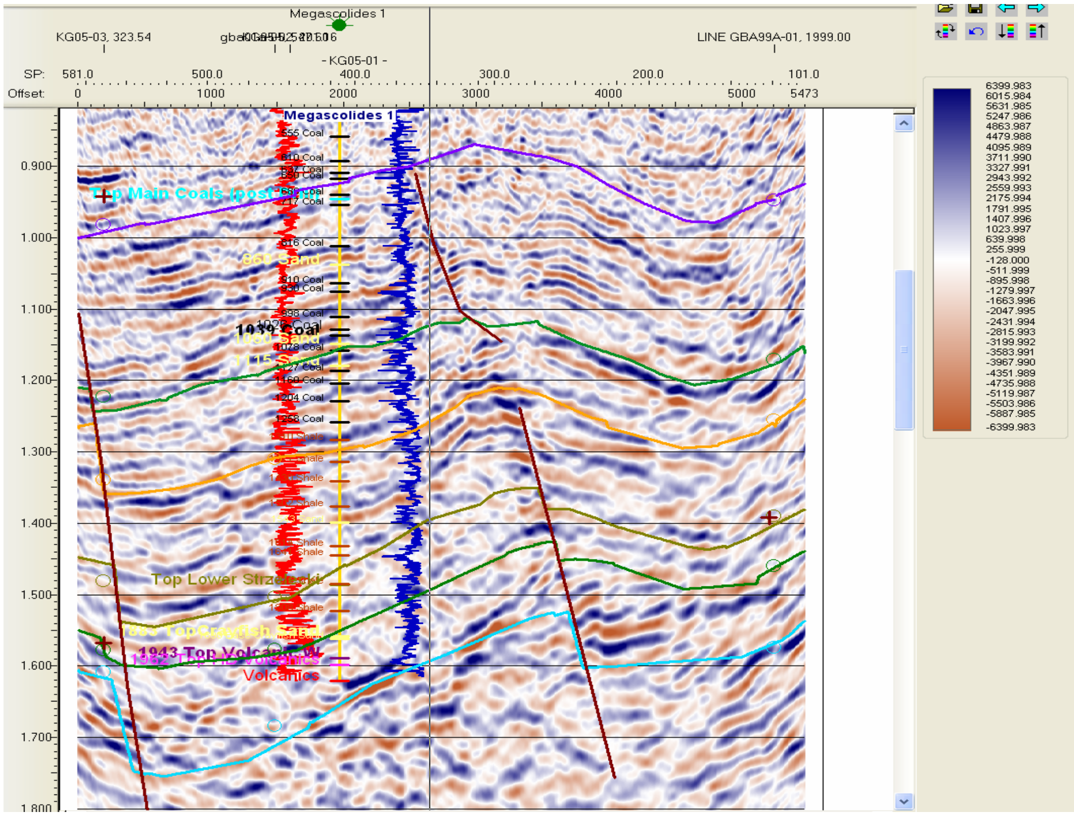

Fig 4. Time seismic section across Megascolides 1 location showing reservoir section in yellow and main coal in black.

3.2.1 Thorpdale Volcanics (Oligocene)
(5.2 to 38.9mRT)

This unit outcrops at the surface and has a base at 38.9mRT.

The unit consists of weathered basalt at the top with boulders and very coarse sands to unweathered black basalt at the base.

The lithologies are described as weathered volcanics to claystone at the top, which is red brown, minor light brown grey to white and mottled, soft to firm, sticky with, rare coarse to very coarse angular quartz sand grains, grading with depth to volcanics which are mainly unweathered, hard, black to dark green black angular basalt fragments, intermixed with common red brown mottled with dark brown and light yellow brown to white claystone (weathered basalt).

3.2.2 Barracouta Formation (formerly known as Childers Formation), Oligocene (?)

(38.9 to 61.9 mRT)

The top of the onshore extent of the Barracouta Formation (known locally as the Childers Formation) is based on a lithology change from the overlying Thorpdale Volcanics basalt to paleosol and coal to massive quartz sandstone. There is an associated increase in rate of penetration and shift in gamma ray on wireline logs.

Lithology:
<u>PALAEOSOL (38.9 to 39.9 mRT)</u>
Claystone (80%) intermixed with Coal (20%)
CLAYSTONE: light green grey, very soft, sticky.
COAL: black, very argillaceous in part, earthy lustre, soft and amorphous.

<u>CHILDERS (39.9 to 61.9mRT)</u>
Massive Sandstone (90%) with minor interbedded Claystone (10%).
SANDSTONE: light orange, very fine to pebble, dominantly very coarse, angular to sub angular, very poorly sorted, trace off white to red brown argillaceous matrix, very weak silica and weak iron oxide cement, clear to opaque quartz grains with common yellow to dark brown iron oxide staining, trace dark brown iron oxide pellets, unconsolidated to friable, has very good visual porosity, no oil fluorescence at top grading with depth to:
SANDSTONE: very light orange grey, has occasional yellow orange iron oxide staining, as above, is very poorly sorted, trace off white argillaceous matrix, trace pyrite, and
CLAYSTONE: light grey, slightly silty, rarely very finely arenaceous, very soft, sticky. non fissile, unconsolidated,

3.2.3 Strzelecki Group

Top: 61.9 m RT **Base**: 1943.8 m RT **Age**: Cretaceous (? *C.striatus* to *F.wonthaggiensis* zone*)*

Upper boundary pick: The top of the Group comprises weathered claystone overlying argillaceous green-grey volcanogenic sandstone. It is distinguished from the overlying faster drilling rate of the Barracouta (Childers) Formation by its lower rate of penetration.
Lithology: Overall the Strzelecki Group consists of interbedded claystone and volcanolithic sandstones with thin interbedded coal seams.

The Strzlecki Group can be further sub divided into a number of “lithological packages”

3.2.3.1 “Upper Unit” Wonthaggi Formation (Strzelecki Group)

Top: 61.9 m RT **Base**: 824.9 m RT **Age**: Cretaceous (? *C.striatus* to *F.wonthaggiensis* zone*)*

Upper boundary pick: The top of the formation comprises weathered claystone overlying argillaceous greenish grey volcanogenic sandstone. This upper unit is distinguished by its slower ROP

Lithology: The Upper unit consists of interbedded claystone and fining up volcanolithic sandstones with thin, rare interbedded coal seams.

The Claystone is generally light to medium grey and medium to dark greenish grey, firm to moderately hard, sub fissile, has minor very fine to silty quartz, rare altered feldspar grains, trace black carbonaceous flakes & laminae and trace micro mica

The Sandstone is light brown to medium greenish grey, friable to firm, very fine to fine quartz, angular to subangular, poorly sorted with abundant medium grey argillaceous matrix, rare to common very light grey altered feldspar, common greyish green volcano lithic grains, trace reddish brown lithics and trace black coaly detritus. The sandstone has poor visual porosity.

The coal is black to very dark brown, is very argillaceous, and has an earthy to sub vitreous lustre and an uneven fracture.

3.2.3.2 'Intra Strzelecki Progrades" Wonthaggi Formation (Strzelecki Group) Purple Seismic event

Top: 824.9 m RT **Base**: 1202.9 m RT **Age**: Cretaceous (? *C.striatus* to *F.wonthaggiensis* zone)

Upper boundary pick: The top of this unit has a 30m claystone with a high GR, shift to the right on the wireline log.

Lithology: This unit consists of a number of stacked 15-40m blocky sands, interbedded with claystone and minor coal beds up to 0.5m thick. Towards the base of the unit the sandstone beds are up to 50m thick

The Sandstone is light to medium greenish grey, friable to firm, very fine to fine, rarely medium, trace coarse quartz, subangular to sub rounded, poorly sorted with abundant medium grey argillaceous matrix, has minor siliceous or calcareous cement, rare to common very light grey altered feldspar, common greyish green volcano lithic grains, trace reddish brown lithics and trace black coaly detritus. The sandstone has poor visual porosity as above.

The Claystone is medium to very dark grey and medium to dark greenish grey, firm to hard, sub fissile, has minor very fine to silty quartz, rare altered feldspar grains, and minor black carbonaceous flakes & laminae.

The coal is black to very dark brown, is very argillaceous, and has an earthy to sub vitreous lustre and an uneven fracture

3.2.3.3 “1200 unit”, Wonthaggi Formation (Strzelecki Group)
Green Seismic event

Top: 1202.9 m RT **Base**: 1502.9 m RT **Age**: Cretaceous (? *C.striatus* to *F.wonthaggiensis* zone*)*

Upper boundary pick: The top of the unit is a thinly interbedded Sandstone and Claystone package approx 20m thick.
Lithology: This unit consists of inter bedded Sandstones, Claystones and very rare coals.

The Sandstone is medium greenish grey, friable to firm, composed of very fine to fine quartz, is angular to subangular, poorly sorted with common medium grey argillaceous matrix, rare very light grey altered feldspar, common greyish green volcano lithic grains, trace crystalline calcite, trace reddish brown lithics and trace black coaly detritus. The sandstone has poor visual porosity

The Claystone is generally medium to dark grey and medium greenish to olive grey, firm to moderately hard, sub fissile, has minor very fine to silty quartz, rare altered feldspar grains, trace black carbonaceous flakes & laminae and trace micro mica

The rare Coal is black to very dark grey, is hard and brittle, has an earthy to sub vitreous lustre, sub conchoidal fracture and is very argillaceous in part.

3.2.3.4 “1500 unit” Wonthaggi Formation (Strzelecki Group)
Orange Seismic event

Top: 1502.9 m RT **Base**: 1809.5 m RT **Age**: Cretaceous (? *C.striatus* to *F.wonthaggiensis* zone*)*

Upper boundary pick: The top of the unit is chacterised by a 50m thick claystone bed and it has a correspondingly higher GR response than the overlying unit.
Lithology: This unit consists of thickly bedded Sandstones and Claystones underlying the thick upper claystone bed.

The Sandstone is light to medium greenish grey, friable to firm, very fine to fine, dominantly very fine quartz, angular to subangular, moderately sorted with common medium grey argillaceous matrix, rare very light grey altered feldspar, common greyish green volcano lithic grains, trace reddish brown lithics and trace black coaly detritus. The sandstone has nil to poor visual porosity

The Claystone is generally as above with minor crystalline calcite vein infill.

Shows in Megascolides-1:

From 1644-1655m there was a complex fault/fracture zone with live medium gravity oil saturation but with no significant associated gas. From 1730-1783m there is a trace solid bright yellow fluorescence giving a weak yellow white crush cut, trace film residue not associated with any observable drill rate fluctuation or gas increase.

3.2.3.5 "1800 unit" Wonthaggi Formation (Strzelecki Group)

Top: 1809.5 m RT **Base**: 1884.8 m RT **Age**: Cretaceous (? *C.striatus* to *F.wonthaggiensis* zone*)*

Upper boundary pick: The top of the unit has a "hot" 15m thick claystone bed and correspondingly higher GR response than the overlying unit.
Lithology: The "1800 unit" is overall a claystone with interbedded sandstone and minor coal. In addition to the upper hot shale there are claystone beds from 1836.6m to 1858.6m and from 1867.7 to 1884.8m. The latter being the top seal to the oil shows in Megascolides-1.

The Claystones are medium olive & greenish grey, hard, sub fissile and very silty to very finely quartzose. There are rare altered feldspars, carbonaceous flakes and micro mica.

The Sandstone Is light to medium greenish grey, hard, very fine to fine, dominantly fine quartz, and sub angular to rounded, moderately sorted, with abundant light grey altered feldspar, lithics and coaly detritus. There is poor to very poor visual and inferred porosity.

Shows in Megascolides-1:
From 1816 to 1850m, there was 40% solid bright yellow fluorescence giving a weak yellow white crush cut, thin film residue. No drill rate increase or mud losses were observed.
From 1865 to 1866m there was a poor oil show where slickenside coaly material had 1% solid bright yellow fluorescence giving a weak pale yellow white slow streaming to crush cut.

Depth (m)	TGAS %	C1 ppm	C2 ppm	C3 ppm	iC4 ppm	nC4 ppm	iC5/nC5 ppm
1511-1841	0.016-0.051	29-124	0-18	1-13	0-15	0-3	0-4/4
1854	0.41	98	23	17	4	0	0
1865-	0.05	72	19	18	6	0	5
1884.4	0.131	154	38	47	22	34	23/19
1889	0.267	218	67	88	49	62	56/42

Table 2. Gas readings across Strzelecki Group in Megascolides-1 from 1511 to 1889m. The values at the base show a relatively higher mud gas kick

3.2.3.6 Rintoul Creek (Top Crayfish Group Equivalent sand) (Strzelecki Group)
Dark Green seismic event

Top: 1884.8 m RT **Base**: 1891.8 m RT **Age**: Cretaceous (? *F.wonthaggiensis* zone*)*

Upper boundary pick: The top pick is based on a lithology change from the overlying Wonthaggi Formation laminated claystone and coal, to argillaceous, quartz sandstone. There is an associated increase in rate of penetration, a shift in gamma ray from the wireline logs and an increase in mud gas readings. Coring will plan to commence above this zone.
Lithology: The upper part of the formation at 1884.8m consists predominantly of coarse sandstone.

The quartzose sandstone is light to medium grey, very fine to very coarse. It has subangular to subrounded grains which are very poorly sorted. It also has a white argillaceous matrix and is moderately silica cemented and moderately calcareous cemented. The sandstone has trace dark grey and red brown lithics and black coaly detritus.

Shows in Megascolides-1:
In Megascolides-1 the upper 3m of this unit is described as tight with only fair visual porosity. A remnant tarry product is present in this upper 3m and extends up into the base of the Strzelecki. The average gas readings in the upper 3m range around 0.05%. Below 1886m (1886-1890m) the total gas readings rise to 0.267%, correspondingly the oil fluorescence increased from 1% of the sample to 50%. Visually this sandstone also appears to have low porosity indicated in part by the low drill rate and fluorescence. However, wireline log analyses result in porosities of 12 to 15%. .

3.2.3.7 Crayfish Group Equivalent shale (Strzelecki Group)

Top: 1891.8 m RT **Base**: 1943.8 m RT **Age**: Cretaceous (? *F.wonthaggiensis* zone*)*

Upper boundary pick: The top of this unit is based on a sharp lithology change from the overlying sandstone to very dark grey shale. There is a corresponding shift in the gamma ray and density curves on the wireline logs.
Lithology: Shale with thin interbedded sandstones.

The shale is very dark grey, slightly to moderately silty, occasional diffuse and intermixed with very finely arenaceous laminae. It is also commonly carbonaceous with minor high angle mineralized fractures and common micro mica.
The thin interbedded sandstones are generally light to medium grey, very fine to occasionally fine, and subangular to subrounded. They have a white argillaceous

matrix with trace grey green lithics and black coal. It also is firm with very poor visual porosity.

Shows in Megascolides-1:
There is some vein infill material which has trace dull patchy yellow fluorescence giving a very weak dull yellow white crush cut, trace residue.

3.2.3.8 Duck Bay Volcanics (Strzelecki Group)

The well may penetrate Duck Bay Volcanics during the Sidetrack. The well will be deepened below the Rintoul Creek sands only for purposes of having enough rathole for wireline logging and for possible dropping of any perforating guns.

Top: 1943.8 m RT **Base:** Approx. 1950 mRT (TD?) **Age:** ?Early Cretaceous (*?F.wonthaggiensis* zone)

Upper boundary pick: The top of the Duck Bay is based on a lithology change from the overlying shale to weathered volcanics shown by the downward shift in gamma ray, neutron-porosity and density logs, decrease in resistivity and sonic and increase in mud gas readings.
Lithology: Weathered volcanics and green claystone.

The weathered volcanics have a cryptocrystalline texture with remnant flow banding, and common small vesicular infill. Near the base from 1963.8m the volcanics become unweathered. It is hard, brittle, bright green in colour, and cryptocrystalline. There is also some calcite veining, and chloritic alteration.

Shows in Megascolides-1:
There is rare vein infill material in the Duck Bay which has trace dull to rarely moderately bright patchy yellow fluorescence giving a very weak dull yellow white crush cut, trace residue increasing with depth to 1% of sample with 20% dull to occasionally bright solid to patchy yellow fluorescence giving a weak yellow white crush cut, thin yellow ring residue. Total gas readings rose marginally.

3.3 Megascolides-1 Reservoir Evaluation

There was 3 to 5 metres of net reservoir sandstone penetrated from 1883 to 1890mRT in Megascolides-1. It is interpreted to be braided fluvial or sheet flood sand deposited in a lower alluvial fan setting. The sandstone contains immature, very poorly sorted, subangular to subrounded quartz sands that coarsen upwards. These sands were analyzed using mud logs, wireline logs and conventional cores. Complete core analysis, description, photos and petrology reports are included within Megascolides-1, Well Completion Report: Basic Data.

Predrill interpretation had anticipated that reservoir development would be good in this area along the northern Strzelecki Basin margin (Blackburn, 2002). It was also considered that there was a risk that earlier deep burial and subsequent uplift and erosion above the base of the *C. hughesii* interval could have resulted in reduced porosity and permeability. Megascolides 1 showed that the sandstone at the top Crayfish Group Equivalent was thinner than anticipated, being located on the lower alluvial fan and displays a lower average effective porosity from 12.29 to 13.39 % (Table 3). The gas peak at 1889m however shows that permeability is fair and reservoir quality may improve towards the main braided channel fill/upper alluvial fan.

Details of the Reservoir Lithology and the core derived porosity and permeability are contained in Attachments 1 and 2.

3.3.1 Petrophysical Evaluation

A brief summary of the petrophysical results from Megascolides-1 is presented below in Figure 5. The figure clearly shows the overlying shale with poor porosity and the two good reservoir sands (Crayfish Group equivalent) with lower water saturation (Sw).

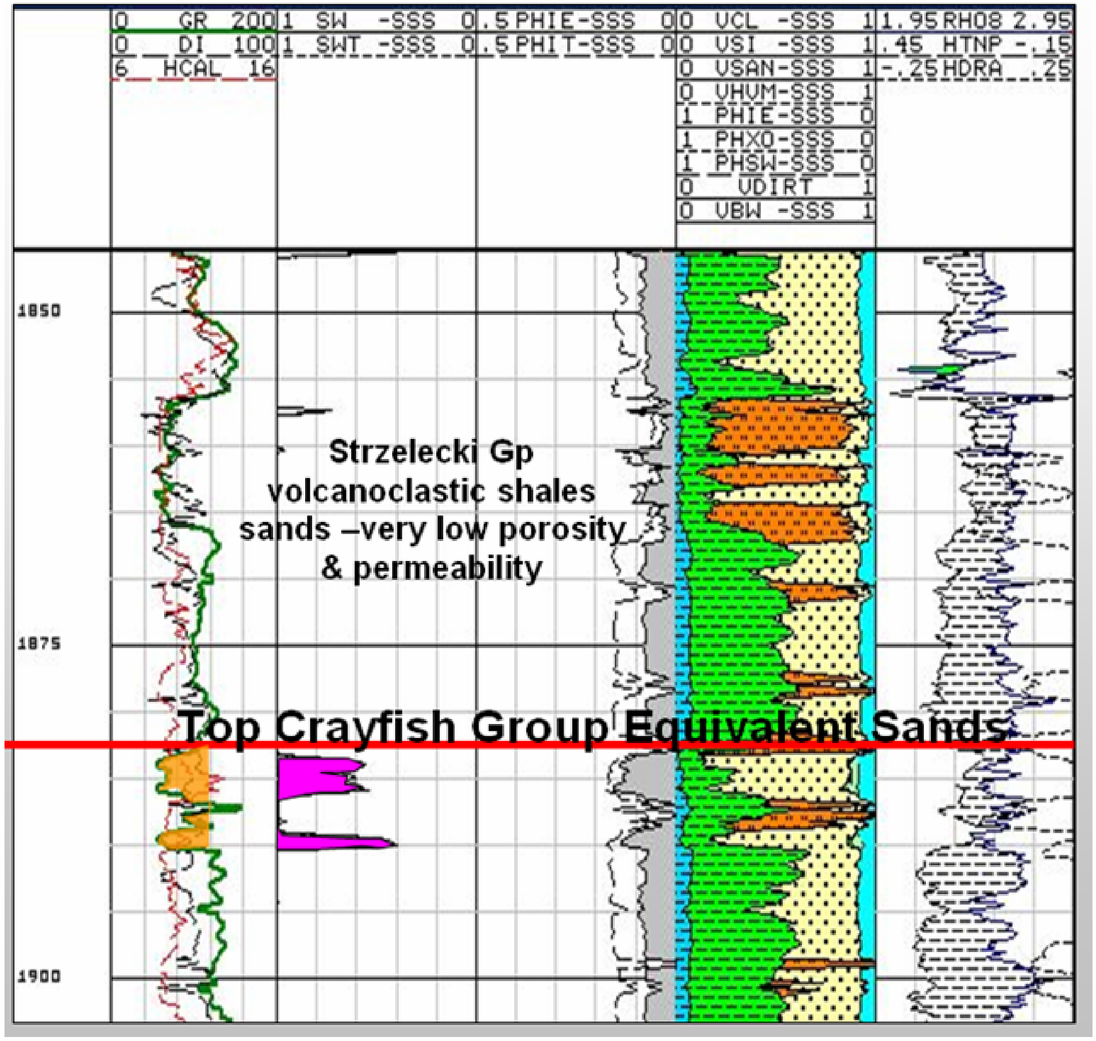

Fig 5. Top Crayfish Group equivalent reservoir interval (Rintoul Creek Fm) showing effective porosity and high oil saturations overlain by volcaniclastic sediments with low porosity ,permeability.and oil saturation.

4: Regional Geology Summary

The EL 4537 license covers an area of (820 km^2) and is generally characterized by extensive outcrop of the Early Cretaceous age Strzelecki Group rocks. The larger PEP 162 oil and gas exploration permit area is more extensive extending to the south coast and Western Port Bay. Thin intervals of Tertiary sediments and volcanics overly part of the Strzelecki outcrop. In restricted areas around the margins of the Early Cretaceous grabens Palaeozoic rocks outcrop or lie beneath the thin tertiary sections (Fig.6).

The Strzelecki group comprises the earliest known sediments in the Gippsland Basin, which were deposited in a series of generally northeast to southwest trending grabens and half grabens. The graben system extends to the east and underlies the giant oil and gas fields of Bass Strait. The same graben system extends to the west at least as far as the western end of the Otway Basin in South Australia. Basement outcrops, comprising Palaeozoic granites and metamorphic rocks occur to the north and south of the permit.

The Strzelecki Group. is divisible into two distinct intervals. The lower Strzelecki interval is an early graben fill sequence of mainly continentally derived, quartz rich fluvial sands, lake deposits and minor local coals and volcanics. It is analogous to the Crayfish subgroup, prospective in the Otway Basin.

The upper Strzelecki Gp.is a later stage graben fill interval dominated by volcaniclastic derived sediments from andesitic/dacitic volcanic rocks erupting to the east. The resulting rock section is characterized by stacked fluvial sands, fine-grained overbank deposits and coal rich intervals best developed near the base of the interval (Wonthaggi coals). This depositional pattern is regionally persistent with indications of marine influences only detected far in the west of the Otway Basin (eg. Troas-1 well). The components of cratonic hinterland derived claystones, quartzose sands and metamorphics is generally less than 20%, except in the basal units, compared with over 85% in the lower Strezelecki.

The presence of the large relative volumes of volcanoclastic material in the Upper Strzelecki (coal bearing interval) is very important for CBM production. The volcanoclastic dominated sandstones alter rapidly with burial resulting in very low porosity and permeability rocks that are as such, very unlikely to provide a water source during production related dewatering of the coals.
The Strzelecki coals appear well developed in this license area of the basin, based on seismic evidence and were deposited during a regionally quiescent period of basin development. Seismic indicates up to 400m of gross coal interval in the license area. Equivalent, though less coaly intervals can be seen right across the Gippsland and Otway basins.

The structural history of this graben system is complex and is the result of the interplay of basement geology with tectonic forces associated with at least four tectonic regimes. These regimes were; the Australia/ Antarctica rift and continental break-up tectonics, the Australia/Norfolk rise rift and continental break-up tectonics, the Australia/Antarctica West Tasmania wrench margin development and the Australia/ Indonesian archipelago collision. The net structural effect in the permit area can be characterized by early major graben development then episodic Late Cretaceous and Tertiary inversion and uplift. The timing and magnitude of the later of these events is locally indicated by the deformation seen in the late Tertiary coals of the Latrobe valley which are underlain by similar Strzelecki Gp. filled grabens. It has been estimated that as much as 1500m of section has been removed over the license area. This is consistent with the regional geologic history of the area.

Local and regional thermal history studies have consistently interpreted a major heating event before the mid Cretaceous and prior to the initial period of deformation/uplift variably expressed along the entire graben system. It is interpreted that prior to the mid Cretaceous, that the rocks within the Strzelecki Group grabens were likely to have matured and generated oil and gas. This is supported by the coal maturity data from the Wonthaggi and Korumburra coal fields which are preserved at maturity levels that can produce oil and gas. These coalfields are sited beside the main depocenter of the Narracan Trough where coal maturity levels are interpreted to be higher.

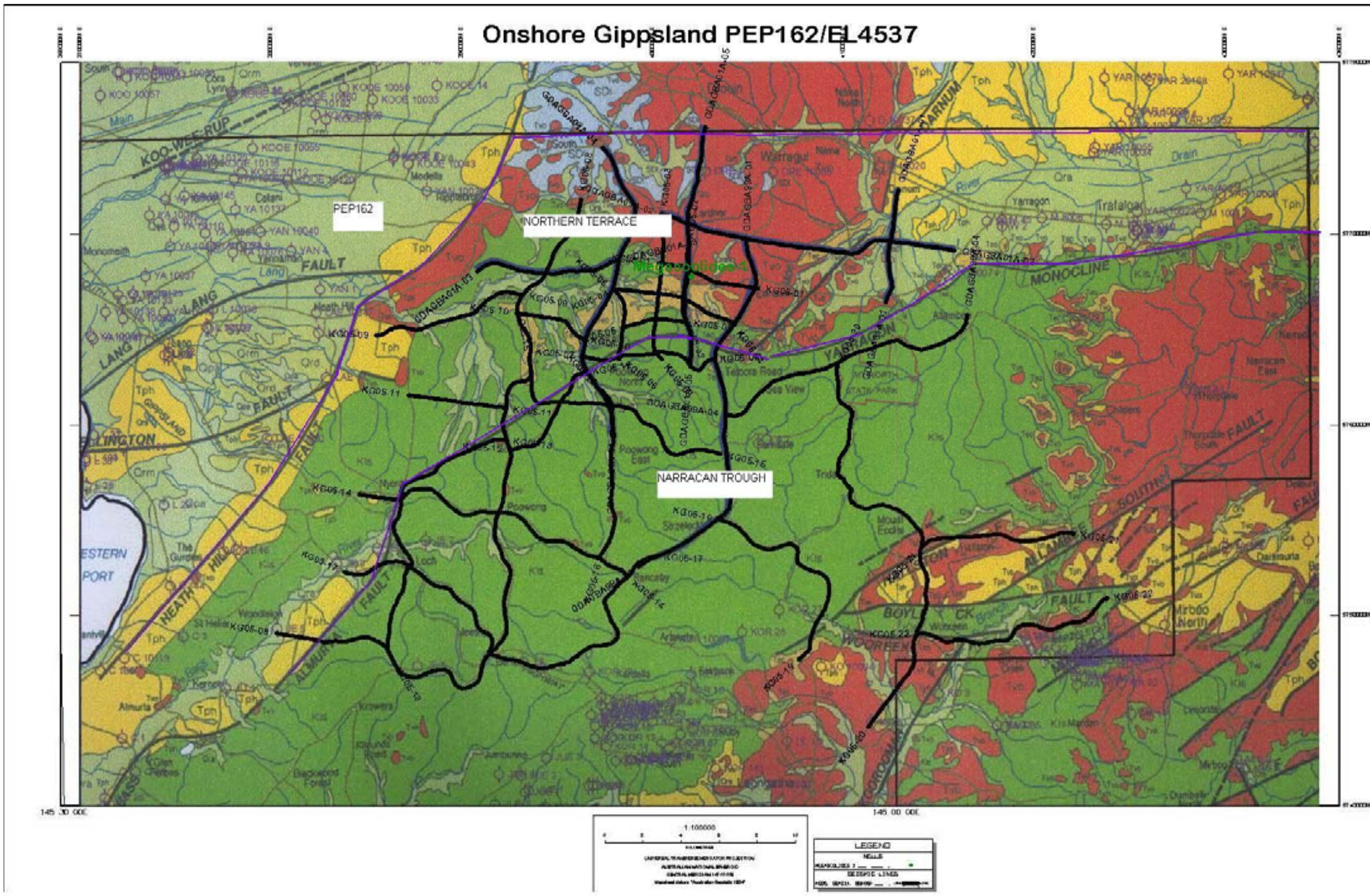

Fig. 6 Regional Geological Map
Green Strzelecki Gp., Red Tertiary Volcs., Lt Brown Childers Fm
Seismic -Black Lines

5: Re entry Geological Programme and Evaluation

5.1 Objectives

The main objectives of re entering the well are to fully evaluate the Crayfish Group equivalent quartzose sandstone reservoir encountered in Megascolides-1. This will be achieved by re entering and sidetracking towards a core point just above the reservoir sandstones. Coring will commence approximately 2m above the expected top of the reservoir sandstone. An 18m core will be attempted. Depending on the recovery and lithology of Core#1 a decision will be made whether to run another barrel before drilling to TD. Sufficient rathole will be required to ensure the wireline logging tools cover the interval of interest. After interpretation of data from the wireline logging, coring and MDT pre tests a decision regarding open hole well testing will be made.

5.2 Mudlogging and Formation Sampling

The Mudlogging contractor will provide 24 hour cover during drilling with 2 mudlogging data engineers. The usual mudlogging services required include:

- Monitoring of drilling parameters, ROP, WOB, Torque etc.
- Catching of lagged samples, washing and drying including supply of all sample bags.
- Monitoring mud pit levels
- Hydrocarbon gas detection (with a digital data set provided at the end of the well).
- Carbon dioxide and hydrogen sulphide gas monitoring.
- Preparation of a mud log with lithology, gas readings, sample fluorescence, drill rate and other significant drilling parameters

The mud loggers will take samples at 5m intervals from the beginning of the sidetrack (or where new hole is penetrated) to Total Depth according to the sampling programme outlined below. The 50 g tray is to be used for onsite sample description then bagged and labeled in small transparent packs for Karoon records. The wellsite geologist is responsible for supervising the mudlogging contractors.

Mud loggers will also assist with core recovery, sampling and description.
At the completion of the well, washed and dried samples are to be distributed as per the following table

The core will be despatched for slabbing and analyses to a laboratory TBA.

Sufficient bottles and containers are to be onsite for collection of fluid samples as required during drilling and drillstem testing.

Sample Type	Weight	Company	Address for despatch	
Washed and dried sample for “Samplex trays”	50g	Karoon Gas	Premium House, Level 9, 406 Collins St., Melbourne, 3000	
One cloth bag-Washed and dried cuttings	250g	Department of Primary Industries (DPI)	TBA	

Other data

Core		Karoon Gas	TBA	

5.3 Wireline Logging

A standard suite of wireline logs will be run by Precision Engineering from TD of the 8-1/2” hole covering the reservoir interval, up to at least 50m above the kick off point for the sidetracked hole. A finalised logging programme will be issued after results of the drilling are known

Run 1 The first run by Precision Engineering will consist of a combination of Gamma Ray, Deep/Medium/Shallow Resistivity, Density, Neutron and Full Wave Sonic.

Run 2. The next run will be the FRT for taking formation pressures. 10 points will be located and advised as soon as possible after the first logging run..

Side wall cores will not be required. Any additional logging runs will be advised.

Logs will be transmitted from the well site in ASCII and PDF form (latter by page) in 1:200 and 1:500 scales.

5.4 Checkshot Survey

A velocity/Checkshot survey will not be required in the re entry/sidetrack hole.

5.5 Coring

Coring will commence 2 metres above the anticipated reservoir depth based on correlation with the offset well 20m away... The top of the reservoir in Megascolides-1 was at 1883 mMDRT (-1758.3 m SS) / (1883.9 mMDRT with CDL rig). The reservoir is expected at 1884.8mMDRT in the sidetrack hole

(assuming a 5 degree kick off). This will be monitored closely and adjusted according to the actual deviation achieved.
The core will be cut, commencing 2m above the reservoir at -1756.3mTVDSS in this well. With respect to the Century drilling rig datum and angle of sidetrack the top reservoir is expected at approximately 1884.8mMDRT in this well and therefore coring will commence by at least 1882.8mMDRT. It is possible hydrocarbons will be encountered higher than expected however it is highly unlikely that coring will commence earlier.

5.6 Testing

Testing is planned during the drilling operations after reaching TD and openhole test equipment will be available. The decision to test will depend on shows, log analyses and pressure measurements. The decision will also depend on permeability measurements from plugs cut from the core at the well site and tested in a lab

5.7 Fluid Sampling

Provision is to be made for sampling of mud and any hydrocarbon fluids from the well bore after side tracking the well.

APPENDICES

Attachment 1: LITHOLOGY/PETROLOGY REPORT

1.1 WELLNAME: MEGASCOLIDES-1

1.2 Sample ID: 1889.0 m, RT, Core

LITHOLOGY: SANDSTONE, Lithic Arkose*:
Framework grains are lower very fine to lower granule-size, dominantly lower medium, very poorly sorted, subangular to subrounded, and overall poorly layered. Visible intergranular porosity is extremely poor; the presence of structural and diagenetic clay phases, and effects of compaction, reduce it. However, secondary porosity is apparent; it is poorly developed and noted mainly as derived from partial dissolution of feldspars.

2 INDURATION: **WELL INDURATED** POROSITY TYPES: **DISSOLUTION>>INTERGRANULAR**

3 MEDIAN GRAIN SIZE: **0.3 MM (MEDIUM)** POROSITY CONTROLS: **COMPACTION, SILICA AND RARE CARBONATE**

Max. grain size: 2.3 mm (Lower Granule) cements, clay phases, selective
Sorting: Very Poor dissolution
Angularity: Subrounded-angular, **Visible Porosity:**< 0.5 %
Sphericity: Low

Framework grains: Predominantly quartz (52 %) and of this a lesser but nonetheless significant proportion comprises polycrystalline grains. A number of quartz grains show abundant sillimanite inclusions (inferred metamorphic sourced) and a few show crystal form reminiscent of volcanic origin. Feldspar grains are common (12 %); plagioclase and K-spar are present in subequal abundance and, moreover, the plagioclase is compositionally quite variable. Rock fragments are also common and can be granitic-sourced (3 %), volcanic-sourced (possibly up to 6 %) and sedimentary-sourced (at least 7 %). Granitic-sourced fragments are generally quartz-feldspar composites, which are readily apparent, while sedimentary clasts and volcanic rock fragments are less easily recognised, in particular where grain-size is finer, and sericite more developed. Chert fragments are also quite common (at least 3 %). Accessory phases include mica (0.5 %; biotite>muscovite), garnet (up to 0.5 %; probably almandite), and traces of zircon. Interestingly, a heavy mineral grain is present with an organic rim; this is probably radioactive xenotime. Rare flakes of ‘coally’ organic matter are noted.

Clay Matrix: Pore-filling and grain-lining structural clays (5 %) are oxide and possibly organic-stained in places and for the most part undifferentiated.

However, illite/sericite is probably the predominant phase. Also present as a pore-fill is authigenic kaolinite (4 %). Kaolinite may completely fill grain-size (secondary) pore space or more commonly occur dispersed with authigenic silica between framework grains

Cements: Silica (at least 5 %) is variably developed as overgrowth cement. In places it is relict (possibly lost at the expense of kaolinite). Minor carbonate (< 0.5 %, and calcite according to stain) is noted as a partial replacement of feldspar grains. A trace of pyrite 'dust', with rare crystalline forms, is noted in the clay-dominated domains.

Visible Porosity: Very poor (< 0.5 %), mainly consisting of intergranular secondary porosity due to the partial (compositionally selective) dissolution of feldspar grains. Several grain-size open pores are possibly a result of carbonate dissolution. Microporosity within the kaolinite-dominated domains is not apparent and overall pore connectivity is inferred to be extremely poor.

* (Folk, 1974)

Attachment 2 Geo Tech: Porosity and Permeability Determination

**POROSITY/PERMEABILITY
AND GRAIN DENSITY
MEASUREMENTS**

GEOTECH

MEGASCOLIDES-1

Sample	Porosity Percentage (%)	Grain Density g/cc	Permeability milli Darcy	Remarks
1889.0m RT Core	10.5	2.66	56mD	Resinated 1.5 inch plug

Due to insufficient sample material, a 25mm diameter plug could not be taken but instead a square block was trimmed from the sandstone sample.

Methods

The square block was solvent extracted in a Soxhlet apparatus. The sample was initially extracted with toluene to remove any hydrocarbons present and then re-extracted with methanol to remove residual salts.

The sample was then dried in a fan-forced conventional oven at 95 deg C until stabilised weight was attained. The sample was allowed to cool to room temperature (approximately 25 deg C) in a desiccator prior to helium porosity measurements.

The helium porosity measurement was conducted at ambient condition in a matrix cup using a Coberly-Stevens porosimeter. Bulk volume was determined by mercury displacement method. Pore volume was calculated from Boyle's Law.

The square block was then mounted in epoxy resin to form a cylindrical plug. Then the sample was left in a drying oven for two days. It was cooled to room temperature before proceeding with permeability measurement.

Air permeability measurement was conducted on the resinated sample using a digital permeameter.