LAKES OIL N.L.

(A.C.N. 004 247 214)

DRILLING PROPOSAL

BELLARINE-1
APPRAISAL WELL

IN

PEP 163

JUNE 2005

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PROPOSAL TO DRILL

1. Prospect Data Sheet

Well Name:	Bellarine-1
Permit:	PEP163, Victoria
Category:	Exploration well
Reference Map:	Paraparap 1:25,000 Topographic 7721-III NE
Location:	AMG Co-ordinates 55 0256384.79 E 5758843.25 N Latitude 38°17'7.6" S Longitude 144°12'52.85" E
Seismic Line:	83-11 VP 640 (Colac Seismic Survey)
Elevation:	G.L. 78m ASL K.B. 81.65 m ASL
Objectives:	Eumeralla Formation sands Pretty Hill Formation sands
Depth to Eumeralla Formation Objective:	Top at approx. 150 m KB
Program Goal:	To appraise the reservoir potential of a large seismically mapped structure 2km to the east of Hindhaugh Creek-1 (drilled in 1969) which was drilled off the top of the structure and flowed gas to surface from several intervals
Proposed Total Depth:	2200 m KB
Estimated Drilling Cost:	[redacted]

2. Location

Approximately 250m south of Vibrator-point 640, Line. 83-11 Colac Seismic Survey

AMG Co-ordinates: 55 0256384.79 E
5758843.25 N

Latitude: 38°17'7.6" S
Longitude: 144°12'52.85" E

Elevation: Ground 78m ASL
K.B. 81.65 m ASL
SurfCoast Shire, Parish of Paraparap, County of Grant, Lot 17.

The site is located approximately 15km south of Geelong. Access to the pad is by means of a short gravel track, which is entered from the east side of the Willowite Rd, approximately 6km west of the Anglesea Rd. Earthworks involve upgrading of the existing access tracks and the preparation of the pad for drilling.
Refer Location Map (Figure1).

3. Regional Geology

The Otway Basin formed as a series of west-northwest trending extensional half-grabens along the south-eastern margin of the Australian continent as a result of the onset of rifting between Australia and Antarctica during the Late Jurassic. The basin covers an area of over 150,000 km^2, of which two-thirds is offshore, stretching from Cape Jaffa in the west to the Mornington Peninsula High (a NE-SW trending basement feature) in the east. The northern margin is taken as the limit of the Early Cretaceous/Tertiary deposition, roughly 60km onshore from the coast. The southern margin is generally accepted as the continental shelf, as the margin lies some 200-300km offshore in deep water and is, at present, poorly defined by seismic.

The stratigraphy, especially in the eastern Otway Basin, is poorly constrained due to a lack of deep (basement penetrating) wells and is based on outcrops of Eumeralla Formation in the uplifted areas and from the few deep wells drilled in the eastern half of the basin. Wedge shaped packages of locally derived, fluvial, quartz-rich arkosic sands (Pretty Hill Formation) were the first sediments deposited, in the lows formed by the developing half-grabens, before the basin was flooded with volcaniclastic sediments (Eumeralla Formation) transported into the basin from the east via a major fluvial braided river system. These sediments include both channel sandstones and overbank/floodplain and lacustrine mudstones.

3.1 Cambrian

Epidiorite greenstones of Cambrian age outcrop in a narrow belt along the Heathcote axis which is interpreted to be located on a line running between Melbourne and Echuca on the Murray River. These greenstones mark the contact between the Ballarat and Melbourne Troughs. At its southern end the Heathcote axis swings to a SSW trend based on shallow mineral drilling and geophysics where it is believed to manifest itself as the You Yangs granite outcrop and then further SSW to the Dog Rocks outcrop where the greenstones are present. The greenstones are at outcrop in the Barrabool Hills 8 km west of Geelong. SSW of here these Cambrian basement rocks can be followed using gravity and magnetic data along the spine of the Otway Ranges from Wensleydale through Olangolah-1 to Cape Otway and beyond.

3.2 Palaeozoic metasediments and granites.

Garvoc-1, Ferguson's Hill-1 and Stoneyford-1 encountered Paleozoic metasedimentary basement. At Stoneyford-1 a phyllite basement occurred. Paleozoic's bound the Otway Basin-Torquay Sub-Basin on the north side along an east-west line which passes between the Barrabool Hills and the You Yangs (granitic) hills.

An important Palaeozoic intersection was made in the CRA coal bore Modewarre-2 bore at +80 m log depth northwest of the Barrabool Hills that helps identify basement on the seismic line OGF92A-403.

Shallow Paleozoic basement forms the Mornington - King Island ridge and shallow basement is expected to the south and east of Cape Otway based on seismic data.

3.3 Mesozoic

3.3.1 Triassic

Rocks of this age occur in the Council Trench at Bacchus Marsh and reworked Triassic spores in Otway-Strzelecki Groups have been located in cores from the Otway and Gippsland Basin indicating that Triassic rocks occur may underlie these sediments in places.

3.3.2 Jurassic

The Casterton Beds are present in the subsurface near Casterton and in the vicinity of Pretty Hill-1 and Woolsthorpe-1. The Casterton Beds may occur in the Torquay Basin associated with the axial core of the Barwon-Torquay Rift. They include volcanics together with dark shales.

3.3.3 Lower Cretaceous

The Pretty Hill Sandstone of the Crayfish Group occurs in the nearest wells of Stoneyford-1, Tirrengowa-1, and Warracburunah-2. At Stoneyford-1 it comprised from 1120-1185m a medium-coarse grained quartz sandstone occurring with minor lithics and shales, overlying sandstones interbedded with siltstones between 1120-1152m, and shales between 1152-1170m. From 1170-1185m the sandstone became coarser grained towards the base, with clear milky white medium-coarse grained sandstone interbedded with coal, siltstone and shale with coally laminae. The sandstone has carbonaceous laminae. This unit rests directly on metasedimentary basement and has good porosity and permeability.

The unit has good reservoir potential with sonic porosity measured in Stoneyford-1 and Tirrengowa-1 of between 13% and 23%. The SP and gamma ray responses are well developed. Conglomerates and sandstones of this age occur in the Barrabool Hills (Coulson 1930) on the northern edge of the Torquay Basin and appear to show measurable porosity. The Pretty Hill Sandstone is also seen in outcrops near Arthur's Seat on the Mornington Peninsula, and equivalent facies occur at Rhyll on Phillip Island.

The Eumeralla Formation of the Otway Group overlies the Pretty Hill Sandstone possibly unconformably. Sediments of this formation are first cycle in nature with abundant volcanolithics. Sedimentation was rapid, there being little opportunity for re-working. The

provenance for these sediments is thought to be associated with volcanic activities associated with the development of the Gippsland-Torquay-Otway Rift. These sediments outcrop along the northern margins of the Bellarine Peninsula at Portarlington and Clifton Springs on the Curlewis Monocline.

3.3.4 Upper Cretaceous

Sediments of this age are well developed in the Port Campbell Embayment and are seen at Cooriejong-2 to the west of the Bellarine-Torquay Block. At this borehole a 320m thickness was encountered. More recent mapping by the Geological Survey recognises a greater thickness of Upper Cretaceous than previously mapped. Offshore the Torquay Basin is known to include some Upper Cretaceous in the Eastern View Formation, including Nepean 37 at Sorrento, and from seismic interpretation.

3.4 Tertiary

The Pebble Point Formation represents the earliest Tertiary sediment in the Otway Basin, and occurs as a pebbly conglomerate often directly overlying Otway Group. The Pember Mudstone of the Dilwyn Formation overlies the Pebble Point Formation, and occurs as a tan brown to grey shale which is dolomitic and slightly carbonaceous. The Dilwyn itself occurs as clear quartz sandstone. These porous and permeable sandstones provide ground water aquifers in the Barwon Downs graben which supplies up to one half of Geelong's water supply.

In the Torquay-Bellarine area the upper part of the Dilwyn Formation's equivalent is the Eastern View Formation, the two units not being connected across the Otway Ranges axis. The Eastern View Formation consists of interbedded sandstone, shale and coal becoming more coally towards the top. Eocene aged brown coals within this formation are mined at the ALCOA Anglesea open cut. The coals of the Eastern View Group overlie typical Wangerrip Group units such as the Dilwyn Formation, Pember mudstone and Pebble Point Formation (Holdgate et al. 2001).

The Mepunga, Narrawaturk and Clifton Formations of the Oligocene Nirranda Group overlie the Dilwyn Formation. Within the Torquay area the Nirranda Group is represented by the Demons Bluff Formation.

The Gellibrand Marl and Port Campbell Limestone of the Heytesbury Group, and the Point Addis Limestone, Jan Juc Marl and Puebla Clay of the Torquay Group overlie the above, and represent open marine cool water carbonate conditions within the Otway Basin and Torquay Sub-Basin.

3.5 Older Volcanics

Oligocene basalt occurs to the south near Aireys Inlet at Eagle Rock. The extrusion here occurs below the Point Addis Limestone. Potassium Argon dating (Abele & Page 1974) of the basalt and tuff indicates an age of 26.5 - 27 million years (Oligocene age). Eocene aged 'older' Volcanics occur at outcrop around the Mt Bellarine area on the Bellarine Peninsula and in coal exploration shafts was found to be up to 22m thick (Daintree, 1861).

Volcanics dated at 27.8 million years occur at Gellibrand to the west of Geelong associated with movement of the Barham Fault on the southern side of the Barongarook High.

Oligocène volcanics were also recorded at Birregurra-1 to the NE of the Barongarook High.

3.6 Younger sediments

A thin veneer of Pliocene to Recent aged gravels and ferruginous sands known as the Moorarbool Viaduct Formation overlies the Mesozoic throughout the Bellarine Peninsula except around Mt Bellarine where Older Volcanics outcrop, and at Queenscliff where Pleistocene limestones occur (Bridgewater Formation). In most areas of the peninsula these unconformably overlie the Otway Group.

4. Permit PEP 163

Lakes Oil N.L. acquired the PEP163 permit in July 2002 along with the adjoining permit PEP 164. Lakes Oil N.L. has a five-year work commitment within this permit including the drilling of at least one well. The drilling of Bellarine-1 will fulfill the drilling commitments for this permit.

5. Exploration History

The earliest work in the Bellarine-Torquay Block was done by private coal companies and the Geological Survey of Victoria primarily in an unsuccessful search for economic black coal. Some deep bores were drilled for black coal in the 1880's and reached 457m still in the Otway Group eg. Bellarine No.1 at Portarlington.

Brown coals were discovered in 1899 around the Otway Ranges and mined at Wensleydale, Deans Marsh and Benwerrin. Later emphasis on brown coal exploration was focussed in the Anglesea area, and a significant deposit was found near the Anglesea township in 1958. Currently ALCOA operates a 1.2 million tonne/year open cut mine extracting brown coal as a feed stock for the Anglesea power station providing electrical generation for their Geelong Aluminium Smelter at Point Henry.

Western Mining Corporation examined the Anglesea area (EL 659) for additional brown coal reserves over the period 1978 - 1983 and also black coal prospects in the Otway Group. They drilled a number of bores at this time. CRA explored the Bacchus Marsh to Bellarine area (EL807-809) for brown coal potential in 1981 and drilled 4 bores on the Bellarine Peninsula to top Mesozoic.

Petroleum exploration in the Tertiary and Otway Group commenced near Torquay with the drilling of Geelong Oil Flow No.1 in 1950. Later wells in the nearby area include Jan Juc 1 and 2. Alliance Oil Dev. drilled Anglesea No.1 to a depth of 3068 m in 1962. Pursuit Oil drilled Hindhaugh Creek 1 to a depth of 2372 m in 1970. Neither of these wells reached Pretty Hill Sandstone. Offshore in the Torquay Basin three wells: Nerita No.1 (1967), Snail No.1 (1973) and Wild Dog-1(1993) tested the prospectivity of the Upper Cretaceous - Tertiary (Figure 2).

In 1960 Alliance Oil aquired 50 km of seismic near Anglesea and later drilled Anglesea-1, Pursuit Oil NL then drilled Hindhaugh Creek-1 in 1970, and then Shell Development and Pursuit Oil carried out seismic surveys in the Hindhaugh Creek area in 1972 and ran some seismic lines

up onto the Paraparap Anticline. In 1982 Gas and Fuel Exploration aquired the adjacent petroleum lease of PEP 100 and later joined by Hartogen Energy Limited carried out seismic surveys with follow up drilling of wells testing the Otway Group/Pretty Hill Sandstone at Olangolah-1 (1982), Stoneyford-1 (1989), Tirrengowa-1 (1988) and Tertiary plays at Ingelby-1 and Nalangil-1 (1990). Their focus has been primarily in the north of PEP 100 and along strike to the Bellarine Peninsula in the Colac Trough area, and only the eastern ends of their seismic lines go near the Bellarine-Torquay area. In 1992 as part of a seismic farmin AGL shot the 302 km Barwon Seismic Survey that includes 5 lines over the Barrabool Hills to Anglesea area (OGF92A 400-409) within PEP163.

In 1993 Capital Energy aquired the former Bellarine Block of PEP 130 block covering the Bellarine Peninsula, carried out gravity surveys in 1995 and surrendered it in 1996. In 1996 Basin Oil acquired part of the old PEP100 area (as PEP 133), drilled Irrewarra-1 to 553 m in 1998 as a base-Teriary test, later Basin Oil was aquired by Origin Energy Resources Ltd and PEP 100 was relinquished in 2000.

Offshore Haematite and Shell carried out early seismic investigations of the Torquay Basin leading to the drilling of Nerita-1 (1967) and Snail-1 (1973). Later Shell (1988) shot high quality seismic throughout the Torquay Basin (Vic P28) with a number of lines running close in to the Bellarine Peninsula. This led to the drilling of Wild dog-1 in 1993. They also carried out gravity measurements at the same time, which can be merged to the onshore gravity of the Melbourne-Geelong Surveys.

No seismic line shooting other than for shallow engineering purposes have to date been allowed in Port Phillip Bay.

6. Tectonic History

The structural development of the Torquay Block and Bellarine Peninsula is a consequence of tectonic activity involving faulting associated with half graben development and transfer faults.

The establishment of the Otway Rift occurred in a bimodal quadrate fashion. Pre-existing lines of weakness projecting southwards from basement outcrops to the north are associated with the greenstone belts located at the contact between differing basement terrains. Across Victoria from west to east these include the Kyndalyn - Rocklands, Warrnambool - Stavely, Barrabool - Heathcote and Yinnar - Mount Wellington axes.

As the Otway basin commenced rift development in Jurassic to earliest Cretaceous times a half graben was established as a result of movement on a growth fault which soled out on a plane of decolement at depth. When this advancing half graben style encountered a pre-existing corridor of weakness a correction occurred which resulted in the establishment of a transfer fault. Often the sense of half graben developed changed on either side of the transfer fault.

Transfer faults are often associated with volcanism as they have no hade and originate at great depth. It has been found that the transfer faults exhibit themselves as a fault trench within the overlying sediments, the width of the trench being proportional to the depth to Moho. These corridors are associated with active seismicity. The Heathcote - Barrabool and Mount Wellington - Yinnar lineaments are both seismically active and numerous small scale earthquakes are associated with the Nerita transfer fault zone and the Selwyn Fault.

A failed rift is seen in the core of the Gippsland Basin, and as an extension into the Torquay Sub-Basin across the Mornington-King Island High, with the northern and southern platforms continuing to support the basin on both sides. In the Colac and Eastern Torquay Sub-Basin significant extension is seen in WNW-ESE directions with the major fault trends in NE directions as far west as the Barongarook High. Major thickening of the half-grabens occurs to the north. West of the Barongarook High (the Stoneyford High of Hill et al., 1994) the trends change to more one of ESE throughout the rest of the Otway Basin, where there is no basement support on the southern margins.

7. Structural Elements

7.1 Barwon - Torquay Trough

This bimodal axial Jurassic - Early Cretaceous core of the Otway Basin trends WSW - ENE across the Torquay Block. It is contained within an envelope indicated by the depth to magnetic basement seen on the CGG aeromagnetic mapping. The trough is seen as a half graben at Anglesea where thick Eocene coals are present on the south side of the Addis structure. The half graben crosses the Otway Ranges and manifests itself as a "saddle" within which the enigmatic "perched" Benwerrin brown coal field is located. The trough then occurs as the SW-NE trending Gellibrand Transfer Fault/Barwon Downs Graben. In bimodal fashion the trough is then seen as a half graben separating the Barongarook High from the Ferguson's Hill High. Reactivating of the early rifting in Tertiary times is evidenced by the presence of Oligocene volcanics along its axis. These occur at Seaview-1, Barwon Downs and Aireys Inlet.

7.2 Nerita Transfer Fault Zone

This strike-slip fault establishes the coastline at Anglesea and has significant bathometric expression. Shell offshore (P-28) seismic data indicates its position.

7.3 Selwyn Transfer Fault Zone

This strike-slip fault represents the eastern side of the Torquay Embayment where the Mornington - King Island Ridge occurs. The Selwyn Fault is also seismically active.

7.4 Bellarine High

This high has been formed as a consequence of the strike slip movements between the Nerita and Selwyn Transfer Fault Zones.

8. Reason for Drilling

Bellarine-1 is designed to appraise the top of the structural high located to the east of the Hindhaugh Creek-1 well (drilled in 1969) which was drilled off the top of the structure but flowed ignitable gas to surface from several intervals. A secondary objective is to prove the existence of the Pretty Hill Sandstone at this location and its reservoir potential.

9. Bellarine Prospect

Geological Prognosis

Age	Formation	Depth Metres KB	Thickness metres
Recent-Pliocene	Post Hetyesbury	Surface	12
Miocene-Oligocene	Jan Juc – Puebla Formation	12	40
Oligocene – Eocene	Demons Bluff Formation	52	58
Palaeocene	Eastern View Formation	110	10
Early Cretaceous	Eumeralla Formation	120	2500+
	T.D.	2200	

Bellarine-1 is located in the eastern half of the Otway Basin on the western edge of the Bellarine Peninsula. The well is situated some 20 km south of Geelong and is very close to major infrastructure greatly reducing any production costs which may be required to bring the field into development. The Otway Basin is a very similar basin to the highly productive Gippsland Basin and has very good potential for the discovery of hydrocarbons. The Otway Basin is generally more gas prone (e.g. Port Campbell gas field and the more recent Casino and Thylacine discoveries) then the oil/gas bearing Gippsland Basin (4 billion barrels of oil/10 trillion cubic feet of gas recoverable).

Bellarine-1 is favourably located up-dip of the non-crestal Hindhaugh Creek-1 well drilled by the Pursuit Oil N.L. in 1969. Hindhaugh Creek-1 is sited approximately 2km off the crest of the structure and was targeting potential oil reservoirs not gas. Gas was successfully tested at surface from several levels but was unmeasured as it was undesirable to produce gas at that time. Bellarine-1 has been designed to target the potential gas reservoirs encountered in Hindhaugh Creek-1 and potentially deeper reservoirs (if present). This early well was drilled on very limited seismic coverage of a very rudimentary nature. Furthermore the well was drilled way overbalance with up to 10.5 pound per gallon mud weight which may have masked hydrocarbon shows in the 'tight' sandstones of the Eumeralla Formation.

The structure, formed during the Miocene inversion experienced throughout the Otway and Gippsland Basins, has four way dip closure at basement and intra-Eumeralla level (see enclosures 1 & 2) and has several potential reservoir intervals present within the structure. The well is also being designed to allow for the potential reservoirs to be 'fracture stimulated' as this has proven successful in the Gippsland Basin with good flows recorded from the 'tight' Strzelecki Formation.

10. Geophysics

10.1 Magnetics

An aeromagnetic survey was carried out by CGG for Shell in 1970 throughout the Otway Basin including the Bellarine-Torquay Block. This survey also extended into the offshore Torquay Embayment. Mapping of Depth-to-Magnetic-Basement was carried out. This shows a WSW-ENE low corresponding to the Barwon-Torquay Rift. Rifting proceeded westward across the Torquay Block in a bimodal fashion. Half Graben extensional development alternated with left lateral strike-slip "transfer" movement. The aeromagnetic low mapped by CGG represents an envelope within which this co-ordinated tectonic activity developed in a "zigzag" style. Depth to magnetic basement under Bellarine was interpreted to vary between 1 km in the northwest to 2 km in the southeast.

10.2 Gravity

Gravity surveys have been carried out since the early 1970's mostly in areas adjacent to the Bellarine Block. This mapping showed the Bellarine Block has a 40 milligal gravity anomaly associated with it indicating a basement high on this reactivated Mid Cretaceous structure. A second high occurs to the north of Bellarine in Port Phillip Bay.

In 1988 Shell carried out a gravity survey in the offshore Torquay Embayment (Vic P28) as part of the seismic survey. This mapping shows that the Bellarine High extends southwards offshore towards Nerita-1 well. Mid Cretaceous arching on the NE Nerita structure as shown on seismic has resulted in substantial truncation of the Lower Cretaceous. This structure was then reactivated in Mid Tertiary times. The Nerita-Bellarine line of gravity highs are separated from the Otway Ranges-Barrabool Hills Highs by a line of gravity lows in the Barwon Trough, and from the Mornington-King Island gravity highs by a gravity low in central Port Phillip Bay to central Torquay Sub-Basin. In this sense the Bellarine High shows true four way dip as a single entity large scale anticline.

10.3 Seismic

Shell carried out seismic work in 1972 in the Port Campbell Embayment which extends to the east as far as the Barongarook High and the Barwon Downs Graben. Shell's seismic work also delineated the half graben setting where the Warracbarunah-2 government stratigraphic bore was located on the northern edge of the Otway Basin.

Gas and Fuel carried out regional seismic in 1983 which identified the Stoneyford and Tirrengowa structures. These lines infilled the Shell coverage and conformed to the same grid direction. Hartogen acquired regional-semi detail seismic in 1983 which consolidated the seismic coverage. Lines were confined to the Port Campbell Embayment and did not go into the Torquay Embayment. Further seismic was acquired in 1986.

These surveys led to the drilling of the Pretty Hill Sandstone at Stoneyford-1 and Tirrengowa-1 and the base Tertiary Pebble Point Formation tests at Ingleby-1 and Nalangil-1.

In 1988 and 1989 Shell acquired seismic (and gravity) data in the offshore Torquay Embayment (Vic P28) and drilled the Wild Dog-1 well prospect in the southern area of the Sub-Basin. In

the1990-1998 period five more surveys were shot including the Barwon survey that covers into PEP163 – Figure 11. The Irrewarre-1 base-Tertiary well test was the last well drilled to the present.

10.3.1 Two Way Time Mapping

Interpretation of the data from the Colac and Paraparap Seismic Surveys involved the preparation of two-way-time structure maps on the following horizons:

Top Basement Seismic Marker	(Enclosure 1)
Intra-Eumeralla Formation Seismic Marker	(Enclosure 2)
Base Tertiary (Pebble Point Fm) Seismic Marker	(Enclosure 3)

The lowermost horizon mapped was the Top Basement Seismic Marker. This event is the most easily identified marker across the Otway Basin and has been identified in basement penetrating wells to the west of the permit. This prominent marker represents the large increase in velocity from the relatively low density sediments of the Eumeralla Formation into the much denser Palaeozoic Metasediments present as basement.

The Intra-Eumeralla Formation Seismic Marker is the most continuous marker within the Early Cretaceous sediments across the Otway Basin. Where it has been penetrated by wells it represents a large coal package present within the lower Eumeralla Formation. The marker is present but poorly imaged beneath the Bellarine-1 well location on most of the seismic lines due to the well being situated close to the end of the lines and due to the fact that it is situated on a basement high and the coal is present in greater amounts in the lows.

The Base Tertiary Seismic Marker is not present across the entire permit area as it has been eroded off the Early Cretaceous highs (Barrabool Hills and the Otway Ranges). The Tertiary sediments are very thin (max. 200m) across this part of the Otway Basin but they thicken significantly towards the west to over 1.5km thick.

10.3.2 Depth Mapping

It was not considered necessary to prepare depth maps of these horizons because of the lack of geological constraint and the high variation in velocities encountered within the Eumeralla Formation. Also the absence of the velocity analysis information from the earlier seismic surveys prevents the preparation of a velocity map encompassing all of the seismic data. All depths have been calculated from information received from the nearby Hindhaugh Creek-1 well.

11. Environmental Impact Statement

Bellarine-1 is located on established grazing land. The drilling pad and access track should involve minimal environmental disturbance. A detailed Statement prepared for Lakes Oil by [redacted] of ENESAR Consulting Pty Ltd is included as Attachment 5.

12. Summary Drilling Program

(i) Set 340mm (13-3/8") conductor at 12m BDF and cement in place prior to commencing day rate rig operations,

(ii) Drill 311mm (12-1/4") hole to approximately 300 m.

(iii) Run 244 mm (9-5/8") casing to 300 m and cement to surface.

(iv) Install wellhead equipment.

(v) Install BOP's and pressure test to 17,500 kPa,

(vi) Drill 216mm (8-1/2") hole into Eumeralla Formation to approximately 1000 m. The Eumeralla Formation may be tested openhole on the way down if required.

(vii) Run wireline logs as per program (Section 19).

(viii) Run and cement 178mm (7") casing to surface. Install wellhead equipment. Install BOP's and test to 17,500 kpa

(ix) Drill 156mm (6-1/8") hole to TD at approximately 2200m. The Eumeralla Formation may be tested openhole out of the 7" casing shoe if required.

(x) Run wireline logs as per program (Section 19)

(xi) Complete evaluation testing as required.

(xiii) Complete as a 114mm (4-1/2") monobore or Abandon hole.

13. Bit Program

Bit #	Hole Size	Interval	Metres	Type
1	311 mm	0 – 300	300	1.1.7
2	216 mm	300 – 650	350	1.1.7
3	216 mm	650 – 1000	350	1.1.7
4	156 mm	1000 – 1400	400	4.1.7
5	156 mm	1400 – 1800	400	5.3.7
6	156 mm	1800 - 2200	400	5.3.7

14. Hydraulic Program

(i) 311 mm Hole

- 2.7 m^3/min with 4 x 16 jets

(ii) 216 mm hole

- 2.2 m^3/min with 4 x 16 jets

(iii) 156 mm hole

- 1.0 m^3/min with 3 x 12 jets

High pump rates will need to be maintained to keep bit and hole clean.

15. Deviation Requirements

311mm section – surveys at 50m, 150m and at 300m TD.
216mm section - surveys on bit trips or at maximum 300m drilled.
156mm section – surveys on bit trips or at maximum 300m drilled.

16. Mud Program

Hole Size	Interval	SG	Vis. (sec)	W.L. (ml)	Notes
311mm	0 – 300	1.03 – 1.08	45	<25	Gel/starch
216mm	300 – 1000	1.10 – 1.15	38	<10	KCl/PHPA
156mm	1000 – 2200	1.15 – 1.20	38	<10	KCL/PHPA

NOTE:

(a) Full mud checks will be performed twice daily under normal circumstances by the mud engineer and/or derrickman.
(b) Running checks of SG and viscosity will be performed by the rig crew every half-hour whilst circulating. A full check will be taken once each tour.
(c) The top section is anticipated to consist of unconsolidated sands with some clays. Mud viscosity through this section will need to be kept high in order to clean and stabilise hole.
(d) A formation leak off test will be taken after drilling 5 m of new hole below the 244mm and 178mm casing shoes.

17. Casing and Cementing Program

(i) 340 mm conductor:

Will be preset at 12 m.

(ii) 244 mm casing:

Set at 300m.

Minimum of 36#, K55, BTC, R3

Burst	- 24,270 kPa	Safety Factor	-	1.65
Collapse	- 13,928 kPa	Safety Factor	-	2.64
Tensile	- 247,664 kg	Safety Factor	-	2.57

Cement: Class A at 1.89 SG to surface.

(iii) 178 mm casing:

Set at 1000m.

Minimum of 26#, K55, BTC, R3

Burst	- 34,337 kPa	Safety Factor	-	2.45
Collapse	- 29,786 kPa	Safety Factor	-	1.50
Tensile	- 188,242 kg	Safety Factor	-	3.24

Cement: Class A at 1.89 SG to surface.

(iv) 114 mm casing (if required):

Set at 2200m.

Minimum of 15.1#, P110, BTC, R3

Burst	- 99,422 kPa	Safety Factor	-	2.45
Collapse	- 87,560 kPa	Safety Factor	-	1.50
Tensile	- 257,187 kg	Safety Factor	-	3.24

Cement: Class A at 1.89 SG to 500m above the 178mm casing shoe. A stage tool may be required to isolate a test or production interval in the Eumeralla Formation.