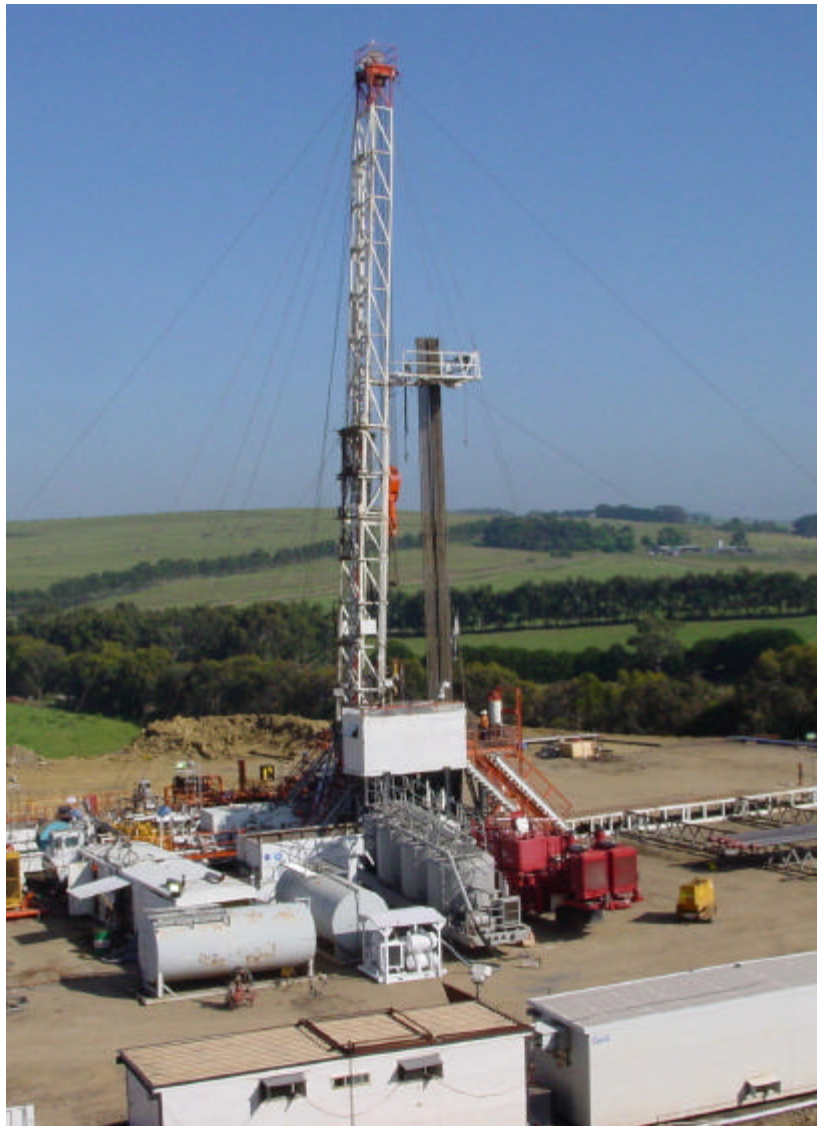


ORIGIN ENERGY RESOURCES LIMITED

DRILLING PROGRAMME

PEP 159

BANGANNA 1



Origin Energy Resources Limited
A.B.N. 66 007 845 338
January 2003

PREFACE

The drilling of this well is to be managed by Oil Company of Australia Limited (A.B.N. 68 001 646 331), an Origin Limited company, on behalf of Origin Energy Resources Limited (OERL).

This document should be read in conjunction with the:

- Origin Energy Otway Basin 2003 (PEP 159 – Banganna 1) Environmental Management Plan, January 2003
- Origin Energy Otway Basin 2003 (PEP 159 – Banganna 1) Safety Management Plan, January 2003

Distribution List

Minerals & Petroleum Division of DPI	3
Origin (Brisbane)	2
Manager – Drilling / Library	1
Drilling Superintendent	1
Operations Geologist	1
Drilling Contractor	1
Essential Petroleum Resources	1
Wellsite	3

TABLE OF CONTENTS

	Page No.
1. GENERAL INFORMATION	1
2. PROJECT	5
2.1. Description	5
2.2. Management	5
3. GEOLOGY	7
3.1. Summary	7
3.2. Permit Summary	7
3.3. Regional Geology	8
3.4. Prospect Description	9
3.5. Well location	10
3.6. Reservoir Pressure	10
3.7. Predicted Stratigraphic Sequence	11
4. FORMATION EVALUATION	12
4.1. Wellsite Geologist's Responsibilities	12
4.2. Ditch Cuttings	12
4.3. Mud Logging	13
4.4. Coring	14
4.5. Testing	14
4.5.1. Crude Oil Samples	15
4.5.2. Gas Samples	15
4.5.3. Water Samples	15
4.6. Measurement While Drilling	15
4.7. Wireline Logging	16
4.8. Sidewall Coring	16
4.9. Velocity Survey	16
5. DRILLING	18
5.1. Introduction	18
5.2. Rig	18
5.3. Hole Size and Casing Programme Summary	18
5.4. Summary of Drilling Programme	19
5.5. Potential Hazards	22
6. BITS, HYDRAULICS AND BHA	23
6.1. 251 mm (9? ") Hole	23
6.2. 171 mm (6¾") Hole	23
6.3. BHA for 251 mm (9? ") Hole	24
6.4. BHA for 171mm (6¾") Hole	24
7. DEVIATION REQUIREMENTS	25
8. MUD PROGRAMME	26
8.1. 251 mm (9? ") Hole	26
8.2. 171 mm (6¾") Hole	26
9. CASING AND CEMENTING DETAILS AND DESIGN	29
9.1. Surface casing procedure - 251 mm (9? ") hole - 194 mm (7⅝") casing	30
9.2. Production Casing Procedure - 171 mm (6¾") hole - 89 mm (3½") tubing	30
9.3. Surface casing cementing procedure - 251 mm (9? ") hole - 194 mm (7⅝") casing	32
9.4. Production Casing Cementing Procedure - 171 mm (6¾") hole - 89 mm (3½") tubing	32
10. PRESSURE TESTING AND KICK TOLERANCES	33

TABLE OF CONTENTS

Page No.

11. ABANDONMENT	35
12. COMMUNICATIONS	36
12.1. OCA (Drilling Manager)	36
12.2. OERL (Prospect Operator)	36
12.3. Daily Reports	37
12.4. Emergency Response Numbers	37
12.5. Emergency Reporting Numbers	37
12.6. OCA/Origin Management Contact Numbers	38
12.7. OCA/Origin Offices	38
12.8. Government & Joint Venture Contact Details	38
12.9. Contractor Contact Details	39

TABLES

Table 1:	Estimated Pore Pressure	11
Table 2:	Prognosed Formation Tops	11
Table 3:	Sample Requirements	12
Table 4:	Sampling Intervals	12
Table 5:	Drilling Programme and Estimated Activity Times	19
Table 6:	Bottom Hole Assemblies (251 mm hole)	24
Table 7:	Bottom Hole Assemblies (171 mm hole)	24
Table 8:	Mud Type by Interval	28
Table 9:	Casing Details and Design	29
Table 10:	Cementing Details	31
Table 11:	Pressure Testing Requirements for BOPs	33
Table 12:	Kick Tolerance Calculations: Base Laira/Pretty Hill Fm Gas Reservoir	34
Table 13:	Abandonment Programme	35

FIGURES

Figure 1:	Location Map
Figure 2:	Central Onshore Otway Basin – Stratigraphic Column
Figure 3:	Banganna 1: Seismic Line
Figure 4:	Proposed Drilling Time/Depth Curve

ATTACHMENT

Well Specification Card

1. GENERAL INFORMATION

WELL NAME: BANGANNA 1

DRILLING MANAGER: OIL COMPANY OF AUSTRALIA LIMITED
A.B.N. 68 001 646 331
Ground Floor, South Court, John Oxley Centre,
339 Coronation Drive,
MILTON Qld 4064
Tel: (07) 3858 0600

PERMIT OPERATOR: ORIGIN ENERGY RESOURCES LIMITED
A.B.N. 66 007 845 338
Ground Floor, South Court, John Oxley Centre,
339 Coronation Drive,
MILTON Qld 4064
Tel: (07) 3858 0600

PERMIT: PEP 159

BASIN: CENTRAL ONSHORE OTWAY BASIN, VICTORIA

LOCATION: GDA 94 Zone 54 (Surveyed)
5 770 482.7 N
603 373.4 E

WELL PATH: Vertical

SEISMIC LOCATION: Line: obe00a-06
Shot Point: 55 m west of SP 423

ELEVATION: Ground Level: 63.7 m (surveyed)
Rotary Table: 68.9 m

PROPOSED T.D.: 2120 m RT

DRILLING CONTRACTOR: Century Drilling Limited,
172 Fullarton Road
DULWICH SA 5065

DRILLING RIG: Rig 11, Cooper LTO 750

PRIMARY OBJECTIVES: Top AVO anomaly: - -1848.0 m TVD SS
(intra Laira Sst/ Pretty Hill Fm) 1916.9 m TVD RT

ESTIMATED DURATION: 12 days

Figure 1: Location Map

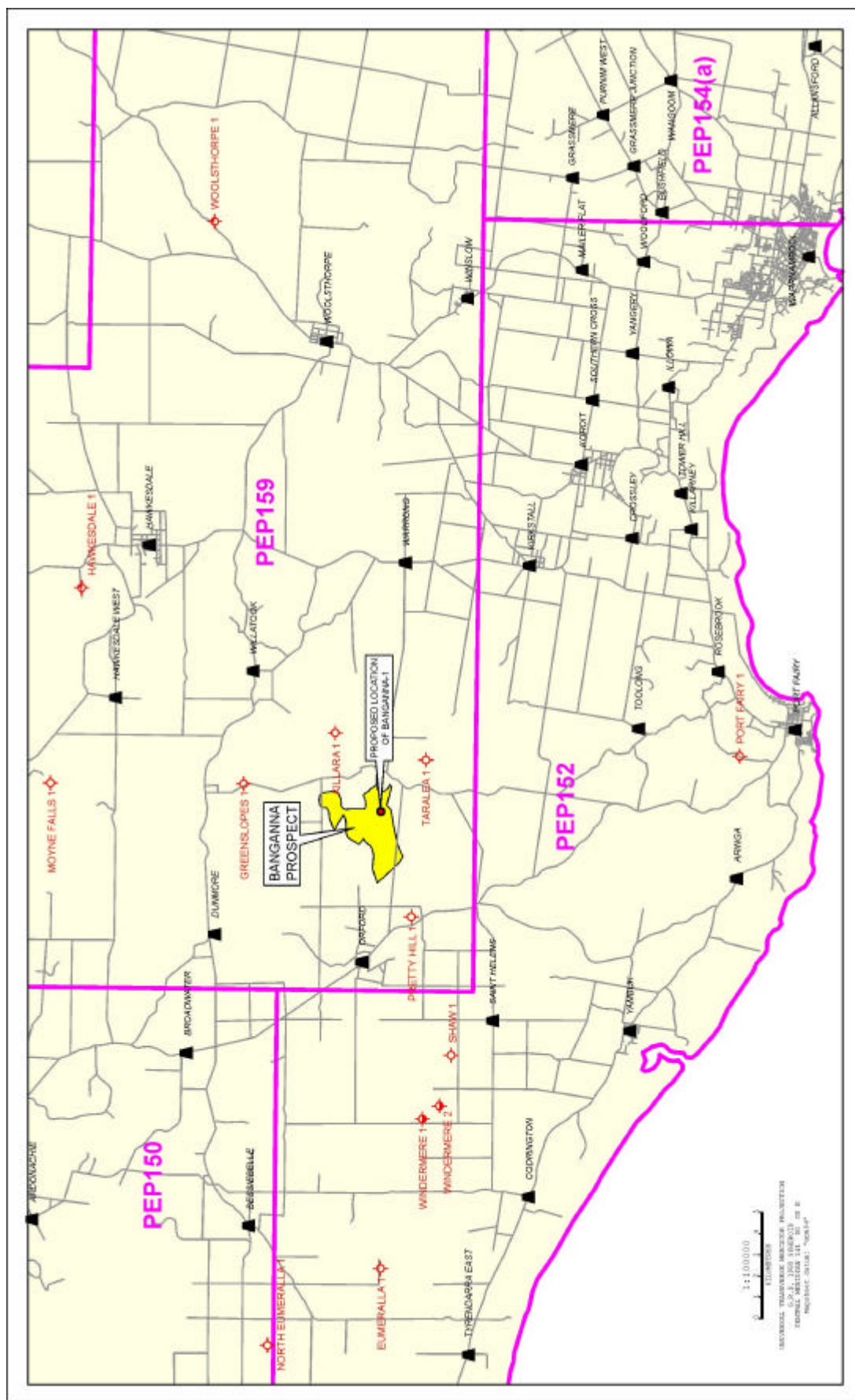


Figure 2

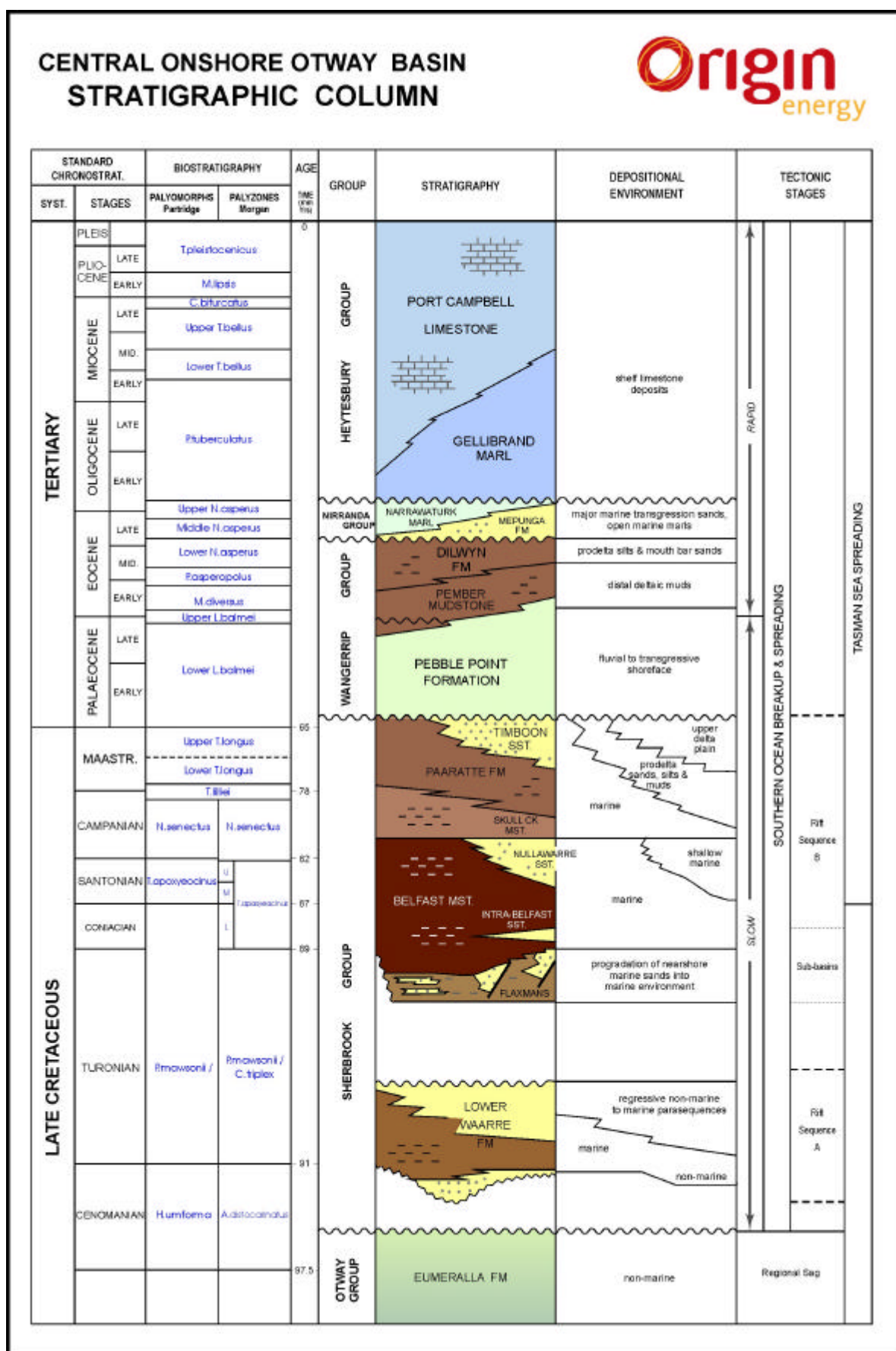
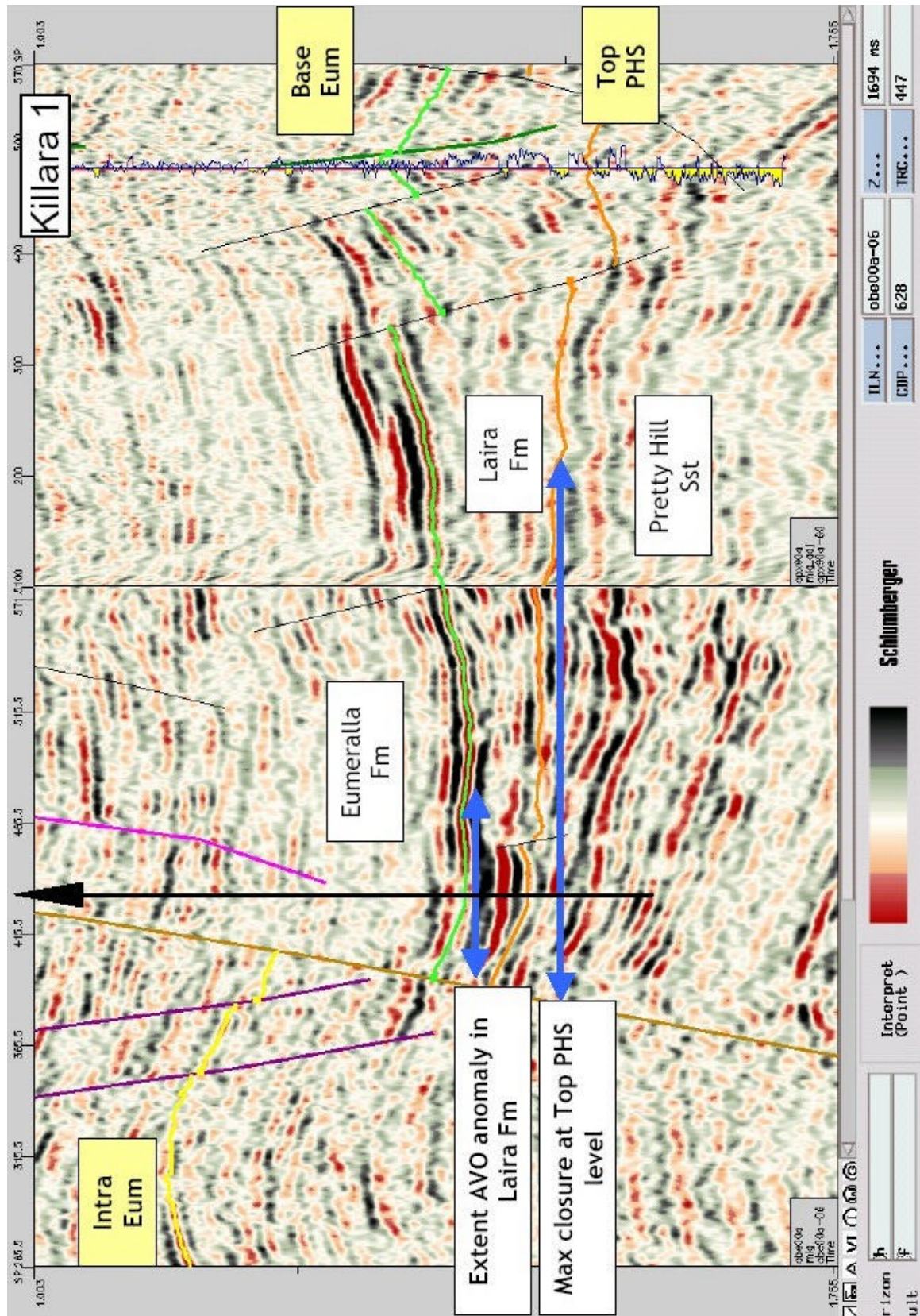


Figure 3
Banganna 1: Seismic Line



2. PROJECT

2.1. Description

The campaign consists of one firm exploration well, Banganna 1, to be drilled in the onshore Otway Basin in south-west Victoria commencing late January 2003. The well will satisfy the Year 2 drilling commitment for the exploration permit, PEP 159.

The CDL #11 drilling rig will be used for the drilling campaign, under a rig sharing agreement with Santos Limited, who will use the rig to drill a well in the onshore Otway Basin in late December. The Origin Energy well will follow after a crew break.

This document outlines the processes for management and the technical procedures for Banganna 1. Banganna 1 is located approximately 20 km north north-west of the Port Fairy township in south-west Victoria. This programme covers the Banganna 1 vertical well, which will be mud drilled to approximately 2120 m, where an evaluation programme of wireline logs will be run. Contingent on hydrocarbon shows, the well may also be cored and tested. If the well is successful, production tubing will be run and cemented and the well will be suspended as a future monobore gas producer.

2.2. Management

This document should be read in conjunction with the Origin Energy Banganna 1, Otway Basin, Safety Management Plan.

The project is being managed by the OCA Drilling Services Group. Ross Naumann, Manager Drilling, is responsible for ensuring that all activities associated with the project are undertaken in full compliance with all statutory regulations and are consistent with Origin Energy policy. Manager Drilling is the Accountable Person for the HS&E performance of the drilling project.

The customer is the Otway Asset, whose designated representative is the Jenny Bauer, Manager, Exploration Eastern Australia. The customer representative retains overall responsibility for the conclusion of the project.

The OCA Rig Supervisor is the senior site representative and is responsible for ensuring that the operational procedures contained within this document are conducted in a Safe & Environmentally sound manner. The Rig Supervisor is responsible for ensuring that all personnel participating in

the project receive a suitable site induction prior to commencement of activities at the site. The Rig Supervisor reports to the Drilling Superintendent.

Position	Contact Person	Title
Customer Representative	Jenny Bauer	Manager, Exploration Eastern Australia
Drilling Superintendent	Ernie Trethowan	Drilling Superintendent
Rig Supervisor(s)	Seton Porter	Drilling Supervisor
	James Dingle	Drilling Supervisor

3. GEOLOGY

3.1. Summary

Banganna 1 is proposed as a gas exploration well in the south-western corner of PEP 159. It is located approximately 3.3 km northwest of Taralea 1, 4.4 km southwest of Killara 1, and 5.3 km east-northeast of Pretty Hill 1 (Figure 1). The Banganna prospect is a large, fault-dependent dip closure at the base Laira/top Pretty Hill level. Banganna 1 will be drilled as a vertical well to a planned total depth of 2120 metres RT.

The reservoir target comprises a possible gas bearing sand at the base of the Laira Formation in addition to potential reservoir sandstones in the underlying Pretty Hill Formation. The main technical justification of the drilling proposal is the presence of a significant AVO-anomaly identified on the 2000 Spring Creek Seismic Survey. Based on the present seismic interpretation, the AVO-anomaly over Banganna is correlated with a reservoir at the base of the Laira Formation.

The existing well logs suggest that the Pretty Hill Formation below the AVO-anomaly represents a thick sand dominated interval and may comprise several reservoir/seal pairs. The seismic appearance and observed amplitudes at Banganna are similar to the gas bearing Pretty Hill in the Penola Trough. The possible extension of the gas column into the Pretty Hill Formation is also suggested by the fact that AVO-anomalies on 3D-seismic data from the Penola Trough are mainly seen at the top of a gas column rather than imaging the entire gas-bearing interval.

The trapping mechanism requires an intra-formational shale layer in the Laira Formation to act as top-seal and a sealing Eumeralla Formation in the hanging wall block of the Tyrendarra Fault to act as cross-fault seal. Charge is believed to have sourced from mature Casterton Formation beneath Banganna and from the east in the Koroit Trough.

The main risk associated with the prospect is cross-fault seal leakage and possible lack of top seal. Banganna 1, if successful, will upgrade the hydrocarbon potential of the Crayfish Group sandstones in PEP 159 and adjacent PEP 152, and may encourage further exploration work focussing on similar structures.

3.2. Permit Summary

PEP 159 comprises 2,280 square kilometres of onshore area in the Victorian part of the Otway Basin. The permit is in the third year of the current 5-year term, which commenced on 12/11/2000.

The current term expires on 11/03/2006. The proposed well, Banganna 1, will meet the formally extended year 2 well commitment.

The current participants in the PEP 159 permit are:

Origin Energy Resources Ltd	50.00% (Operator)
Essential Petroleum Resources Ltd	50.00%

Pretty Hill 1, the first exploration well in the permit, was drilled in 1962. Since then, a further eight wells have been sunk in PEP 159, but no commercial hydrocarbons have been found despite numerous oil and gas shows. A total of 1997.35 kilometres of 2D seismic data have been acquired since 1958 including the most recent Spring Creek Seismic Survey in 2000 and Gypsy's Creek Seismic Survey in 2001.

3.3. Regional Geology

Situated in the Victorian part of the onshore Otway Basin, PEP 159 contains prospective Early Cretaceous Crayfish Group sediments overlain by a thick Eumeralla Formation and thin Tertiary Wangerrip and Heytesbury Group cover. The Late Cretaceous Sherbrook Group is thin or absent in PEP 159.

The main structural elements in the vicinity of PEP 159 are the Windemere, Koroit and Morenda Troughs. The Windemere and Koroit Troughs are half grabens bounded to the north by the Tyrendarra Fault complex. A north-south oriented transfer zone appears to offset the Tyrendarra Fault from the Tower-Taurus Fault Complex, and forms the dividing line between the Windemere and Koroit Troughs. PEP 159 largely overlies the footwall block of the Tyrendarra Fault and the Tower-Taurus Fault Zone.

The permit is dominated by a series of east-west trending normal faults, with the Sherbrook Group and Otway Supergroup sediments progressively thickening to the south across each successive fault. The main exploration targets in PEP 159 are the Pretty Hill Sandstone, Laira Formation and Pebble Point Formation. The Heathfield Sandstone Member of the Lower Eumeralla Formation may also represent a potential reservoir unit.

The best quality source rocks in the area are coals and shales within the Casterton Formation. Maturation modelling indicates that the Casterton Formation beneath Banganna, and to the east in the Warrong Trough, reached peak generation towards the end of the Early Cretaceous. Therefore the Banganna structure is likely to have been charged at the end of the Early Cretaceous with minor

additional charging possibly occurring in the Late Tertiary. The coals at the base of the Eumeralla Formation could also be a potential source, but this would require face-loading across the Tyrendarra Fault, as they are presently immature for oil and gas to the north on the footwall block, but are early mature on the hanging wall side.

The existing wells penetrating the Pretty Hill Formation have confirmed fair to excellent reservoir properties for these sandstone intervals. Explanations for the failure of the existing Pretty Hill tests in the PEPs 152 and 159 include lack of closure, cross-fault seal failure, missing top-seal, and fault leakage. In some cases, it is not possible to determine the failure criterion due to sparse seismic coverage, the quality of the seismic data, and the overall uncertainty associated with the interpretation of individual prospects. However, the presence of numerous hydrocarbon shows and the fact that Windemere 1 recovered hydrocarbons from the Heathfield Member of the Eumeralla Formation, indicate the presence of a working hydrocarbon system.

More recently, Port Fairy 1 in the southern part of PEP 152 encountered strong oil and gas shows in the Late Cretaceous Flaxmans Formation. The well is currently interpreted as a non- to sub-commercial gas condensate discovery.

The stratigraphy of the central onshore Otway Basin is summarised in Figure 2.

3.4. Prospect Description

The Banganna prospect was originally identified as a fault related Pretty Hill Sandstone play located in the footwall block of the Tyrendarra Fault. Following the acquisition of the Spring Creek Seismic Survey in 2001, and the subsequent remapping of the prospect, the presence of an AVO-anomaly became apparent below the Crayfish Unconformity.

The AVO-anomaly straddles the interpreted top Pretty Hill seismic event on lines obe00a-04 and 05, and occurs immediately above the base of the interpreted Laira Formation on line obe00a-06. The AVO-anomaly visible on line obe00a-06 is most likely related to a sandstone layer at the base of the Laira Formation as encountered in Killara 1 which had a weak oil show.

The Banganna Prospect can be subdivided into two compartments by the NW-SE striking fault. The dividing fault shows only minor throw (10- 50 m) and may not seal at Pretty Hill level. As the AVO-anomalies on lines obe00a-05 and 06 are restricted to the eastern fault compartment, the same fault may be sealing for a thin intra-Laira reservoir.

The larger closure at Pretty Hill level is dependent on the main EW-striking Tyrendarra Fault in the south and a second NW/SE-striking fault in the west. Towards the north and east the prospect is controlled by dip closure.

The trap requires an intra-formational shale layer in the Laira Formation above the reservoir sands to act as the top-seal, and the Eumeralla Formation in the hanging wall block of the Tyrendarra Fault to act as the cross-fault seal.

The seismic appearance and observed amplitudes in the Pretty Hill Formation at Banganna are similar to the gas bearing Pretty Hill Sandstone in the Penola Trough where the AVO anomalies only occur at the top of the gas column of known pools. Since the base of the gas columns in the Penola Trough are not being imaged, it is therefore highly likely that the gas column at Banganna extends down below the AVO into the Pretty Hill Sandstone.

Based on the existing log data in PEP 159, the Pretty Hill Formation at Banganna is either a thick sand-dominated interval or comprises several reservoir/seal pairs.

No core data are available from the intra-Laira sands, however, log analysis from the sandy Laira at Killara 1 indicate an average porosity of 15 %, which supports the expected value derived from the porosity/depth cross-plot of nearby wells.

3.5. Well location

The proposed location for Banganna 1 is situated 55 m west of shotpoint 423 on seismic line obe00a-06. It is not possible to locate the well directly on seismic line obe00a-06 due to surface basalt conditions.

As indicated in Table 2, the well will penetrate the Tyrendarra Fault. The actual thickness of the fault zone is unknown and some uncertainty exists in the exact positioning of the fault trace on the 2D seismic line. While it is difficult to prognose the exact depth range in which the well trace will penetrate and/or run sub-parallel to the fault zone, an estimate of 998-1141 (within the Eumeralla Formation) has been made.

3.6. Reservoir Pressure

Pore pressure in the intra-Laira Sandstone/Pretty Hill Formation may be elevated due to the presence of a hydrocarbon column. Approximately 85 m of closure is mapped below the well intersection. A gas gradient of 1.291 kPa/m (0.1872 psi/m) has been used, based on regional well data.

Table 1: Estimated Pore Pressure

Formation / Column height	Aquifer Hydrostatic	Depth of Intersection m AMSL	Pressure (psia)	SG EMW
Intra-Laira Sst/ Pretty Hill Fm 85 m mapped closure below the well intersection	To surface, undepleted	-1848	2821	1.04

3.7. Predicted Stratigraphic Sequence

The predicted section for Banganna 1 is given in Table 2. The following prognosis is for a vertical well. Geophysical picks are shaded.

Table 2: Prognosed Formation Tops

Formation	Depth (m RT)	Depth (m TVD SS)
Surface Basalt	5.2	63.7
Port Campbell Limestone	45.2	23.7
Gellibrand Marl	149.9	-81.0
Clifton Formation	380.9	-312.0
Dilwyn Formation	411.9	-343.0
Pember Mudstone	500.9	-432.0
Pebble Point Formation	555.9	-487.0
Paaratte Formation	580.9	-512.0
Skull Creek Mudstone	636.9	-568.0
Nullawarre Greensand	661.9	-593.0
Belfast Mudstone	682.9	-614.0
Flaxmans/ Waarre Formations	724.9	-656.0
Eumeralla Formation	762.9	-694.0
<i>Fault Zone</i>	<i>1066.9 to 1209.9</i>	<i>-998.0 to -1141.0</i>
Killara Coals	1805.9	-1737.0
Laira Formation	1878.9	-1810.0
Pretty Hill Formation	1959.9	-1891.0
Total Depth	2120.0	-2051.1

4. FORMATION EVALUATION

4.1. Wellsite Geologist's Responsibilities

The Wellsite Geologist is responsible for geological supervision at the wellsite and for formation evaluation. The Wellsite Geologist reports to the Drilling Supervisor at the wellsite and to the Operations Geologist in Brisbane. The Wellsite Geologist supervises the mud logging unit, mud loggers and wireline logging, and prepares their own cuttings and core descriptions.

Additional samples may be collected at any time at his discretion. Significant drilling breaks will be penetrated by no more than 2 m then flow checked for fluid influx. If a sample of the new lithology is required for hydrocarbon show evaluation, drill 3 - 5 m from the drilling break, then pull up at least 6 metres above and circulate out the break. If a PDC bit is in use, the drilling parameters (WOB etc) should be kept relatively constant as the primary objectives are approached, and any significant change in drill rate (increase or decrease) investigated as above.

4.2. Ditch Cuttings

Table 3: Sample Requirements

Sets	Size	No	Type	In	For
A	500 g	1	Unwashed & air dried	Cloth bag	ORIGIN
B&C	250 g	2	Washed & air dried	Minigrip bag	MPD of DPI
D	100 g	1	Washed & air dried	Minigrip bag	ORIGIN
E		2	Washed	Samplex tray	ORIGIN

Table 4: Sampling Intervals

Interval	From	To
10 m	Surface	Surface Casing Shoe
5 m	Surface Casing Shoe	1800 m
3 m	1800 m	Total Depth

Additional samples will be taken to evaluate shows and at any time deemed necessary by the Wellsite Geologist. At the discretion of the wellsite geologist, sampling intervals may be increased through intervals of fast drilling to limit the samples caught per hour to a maximum of six. **Below 1800 m, a 1 litre mud sample will be taken every 100 m while drilling and preserved with biocide for future analysis.** A mud sample will also be taken prior to running MDTs or DSTs.

4.3. Mud Logging

The selected mud logging company will provide mud-logging services from surface to total depth.

The unit will provide continuous 24-hour surveillance of drilling operations including:

- Total gas detection
- Chromatographic gas analysis
- Continuous CO₂ detection
- Continuous H₂S detection
- Measured depth
- True vertical depth as calculated from surveys
- Rate of penetration
- Weight on bit
- RPM
- Pump stroke rate
- Mud pit levels

Before surface casing is set a single H₂S sensor will be mounted in the possum belly and used to continuously monitor ditch gases for H₂S. Detection of H₂S will trigger a pre-set alarm inside the mudlogging unit.

A comprehensive 1:500 scale mud log will be maintained at all times from surface to total depth, and **will include WOB and RPM in the ROP column.** An up-to-date log is to be submitted daily to the Wellsite Geologist in time for the daily report along with a ***.PDF** file for transmission to Brisbane. A complete **ASCII** file containing the metres drilled, rate of penetration, WOB, RPM, total gas and gas breakdown (including CO₂ and H₂S) is to be transmitted to the Brisbane office on reaching Total Depth, and at other times as requested.

All instrument charts are to be annotated with: depth (in metres), attenuation changes, dates, times and sample collection intervals. Charts are to be submitted to the Company Representative prior to release of the mud-logging unit.

Gas detectors and chromatographs are to be calibrated with standard check gas blends each trip. Total gas detectors are to be calibrated so that 1% methane in air will produce a chart deflection of 50 units. CO₂ and H₂S draeger tubes will be on site for evaluation of formation gas samples from MDT or DST.

Calcium carbide lag checks will be run once per day or every 300 m, whichever occurs first (or at the discretion of the Wellsite Geologist). Total gas units and lag times (actual and calculated) are to be recorded on the mud log in minutes. No carbides are to be run whilst evaluating prospective hydrocarbon zones.

Formation Integrity / Leak-off / Extended Leak-off Tests, pit losses/gains, tight-hole, bit data, mud information and survey data are to be recorded on the mud log. The mud loggers will be responsible for time lagging, collection and description of drill cutting from surface casing shoe to total depth. Routine microscopic and fluoroscopic examination of ditch cuttings for hydrocarbon shows will be undertaken.

Upon encountering a significant drilling break the interval is to be penetrated by no more than 2 m; drilling will be suspended and a flow check conducted. Bottoms up will be circulated if a sample of the new lithology is required for hydrocarbon show evaluation. Drill 3 - 5 m from the drilling break, then pull up at least 6 m above the top of the drilling break to minimise formation damage. If a PDC bit is in use, the drilling parameters (WOB etc) should be kept relatively constant as the primary objective is approached, and any significant change in drill rate (increase or decrease) investigated as above. If the Wellsite Geologist is not present, inform the Drilling Supervisor.

4.4. Coring

An 18 m conventional core will be cut if a hydrocarbon bearing sand is encountered in the basal Laira or Pretty Hill Formations, with coring to commence 3-5 m into the sand. As intra-formational seals and stratigraphic traps are possible, a sample will be circulated up from every drill break in the sequence, after drilling 3-5 m of the new lithology. Gas is considered more likely than oil to be present at Banganna, in which case high ditch gas readings will be the key indication that a hydrocarbon bearing sand has been penetrated.

Additional cores may be cut if reservoir quality and/or hydrocarbon shows are still present at the base of the first core, with approval of the Asset Manager. (Note that bottoms up will not be circulated while coring to avoid washing out the core, so it may be difficult to determine that the base of the core is still gas bearing.) If the first core bottoms in shale, the decision may be made to return to drilling until another sand is encountered and evaluated as above. Up to 85 m of closure is mapped below the well intersection.

4.5. Testing

One open-hole DST is programmed to be conducted after wireline logging, contingent on hydrocarbon shows. No surface separator is required, as the most likely hydrocarbon fluid is a relatively dry gas. Additional open hole DSTs and/or cased hole production tests will be added to the programme if warranted. A failsafe testing head with remote activation will be used. Approval of the final testing programme will be sought from the Minerals and Petroleum Division of the Department of Primary Industry.

The following samples are required for each DST undertaken. All samples will be labelled with: Well Name, Date, DST Number, DST Interval, Formation, Sample Origin and Temperature.

4.5.1. Crude Oil Samples

If crude oil is recovered, two 5 litre can samples will be taken for analysis. Preliminary analysis of the API gravity and pour point of the oil will be made at the wellsite.

4.5.2. Gas Samples

A minimum of two samples will be collected under pressure in an evacuated steel cylinder (500 - 1000 ml) for analysis. A sample of any gas to surface will be analysed at the wellsite using the chromatography in the mudlogging unit. The sample will be tested for the presence of H₂S and CO₂ using draeger tubes supplied with the mudlogging unit. Avoid saturating the detector by diluting with air.

4.5.3. Water Samples

The following samples are required for hydro geochemical evaluation

- | | | | |
|-------|---------------------|---|---|
| (i) | Drilling mud sample | - | 1 litre plastic bottle, |
| | | | Samples to be collected while drilling every 100 m below 1800 m , and immediately prior to testing. Preserve samples with biocide. |
| (ii) | Make-up water | - | 1 litre plastic bottle |
| (iii) | DST samples | - | 1 sample from the top |
| | | - | 1 sample from the middle |
| | | - | 1 sample from the bottom |
| (iv) | Mud filtrate | - | 20 ml sample |

Collect each sample in a 1 litre plastic bottle. If an organic extraction of possible petroleum components from the water is required, then two samples in 1 litre GLASS bottles should be collected.

4.6. Measurement While Drilling

No MWD tools are programmed to be run in the well.

4.7. Wireline Logging

Logs are to be displayed at 1:500 and 1:200 scales.

NB: A PDF of each main log at 1:500 and repeat section at 1:200 is to be transmitted to the Brisbane office ASAP after acquisition. A single paper copy of the logs is to be produced on site. This will be quality controlled in the OERL office and edited by the logging contractor before final prints are made.

Suite 1: 171 mm (6¾") Openhole:

RUN 1:	PEX	TD to surface casing shoe, high resolution repeat section above TD.
	DSI	TD to surface casing shoe, P& S mode only.
	GR	TD to surface.
RUN 2:	HNGS	Minimum survey interval above TD.
	FMS	<i>If well is cored:</i> minimum survey interval above TD, GPIT to surface casing shoe. <i>If well is unsuccessful:</i> FMS to above fault zone, GPIT to surface casing shoe.
Wellsite Processing: MSDip Dipmeter and Formation MicroImager Quicklook.		
RUN 3:	MDT-GR	Pressure tests contingent on shows and log evaluation.
		Wellsite Processing: MDT Pressure Profile.
RUN 4:	CSAT-GR	T.D. to surface casing shoe, continued inside casing until signal deteriorates

Horizontal log scales:

GR	0 - 250 API
SP	-50 - +50 MV
HALS, MCFL	0.2 - 2000 ohmm
BHC/AS	140 - 40 u/sec
RHOB	1.95 - 2.95 g/cc
NPHI	0.45 - -0.15 pu

4.8. Sidewall Coring

No sidewall coring is programmed for the well, as the palynological zonation is too broad to yield useful stratigraphic data, and the intention is to cut at least one conventional core if a hydrocarbon bearing sand is encountered.

4.9. Velocity Survey

A velocity survey is programmed at the total depth of the well. The survey will include a well static survey taken with the geophone depth equal to mean sea level and offset shots at 5 m, 25 m and 50 m

from the well head, and in the flarepit to determine if a static mistie exists between the well and seismic, and between shot locations. Offset shots should be acquired at a consistent depth of less than 0.5 m (as safety permits) to minimise error when correcting to vertical travel paths.

The remaining shots will be run from the sump. Be aware of the need for safety when larger charges are required to acquire the deeper shots. All shots should be made at the same depth, with those in the sump always taken in the same position. Two, or three shots if required, should be taken 1-2 m below selected formation tops and at 50 m spacing within formations. Actual formation tops are to be picked from logs. The shaker test on the CSAT tool will be used to verify good coupling with the formation before acquiring data.

The survey will be continued inside the casing until the signal deteriorates. Since the surface casing will be cemented back to surface it is possible that good data will be obtained throughout the cased section.

The preferred order of shooting, and the formation tops to be used will be advised prior to the run, based on the results of the first logging run of the suite.

NOTE:

1. The datum to be used in construction of the T.D. curve is Mean Sea Level.
2. If it is at all possible, run the velocity survey during daylight hours. This may require rearrangement of the logging programme.

5. DRILLING

5.1. Introduction

The following sections outline the recommended drilling programme. Minor modifications to the programme may be made at the discretion of the wellsite personnel in consultation with the Company Representative. Any substantial changes in the programme require approval from the Brisbane Office, and must be accompanied by an approved "Change Control Record".

After the rigging up, a pre-spud safety meeting will be held to outline the well programme and to reinforce the need for all personnel to be aware of and to work in a safe manner. Particular attention is to be given to the "Work Permit System". The mousehole and rathole will be drilled and cased. The rig will be put in a safe and good housekeeping order prior to spudding the well.

5.2. Rig

RT height above ground: 5.2 metres.

All depths referred to throughout this programme unless otherwise noted refer to "along hole measured depth below rotary table".

5.3. Hole Size and Casing Programme Summary

	CONDUCTOR	SURFACE HOLE	PRODUCTION HOLE
Hole Size	445 mm (17½")	251 mm (9? ")	171 mm (6¾")
Casing Size	340 mm (13? ")	194 mm (7? ")	89 mm (3½")
Setting Depth	40 m	520 m	2120 m

A conductor will be set through the surface basalt prior to the drilling rig moving on site. The 194 mm (7? ") casing will be set at approximately 520 m in the Pember Mudstone to protect the overlying Dilwyn Formation aquifer from contamination with the KCl drilling fluids that will be used in the production hole section. This casing point should provide sufficient kick tolerance to drill to the proposed TD. On Taralea 1 an FIT was conducted to 1.55 SG (12.9 ppg) EMW at 498 m, 13 m into the Pember Mudstone. A LOT will be conducted in Banganna 1 after drilling out the shoe and no more than 5 m of new formation.

5.4. Summary of Drilling Programme

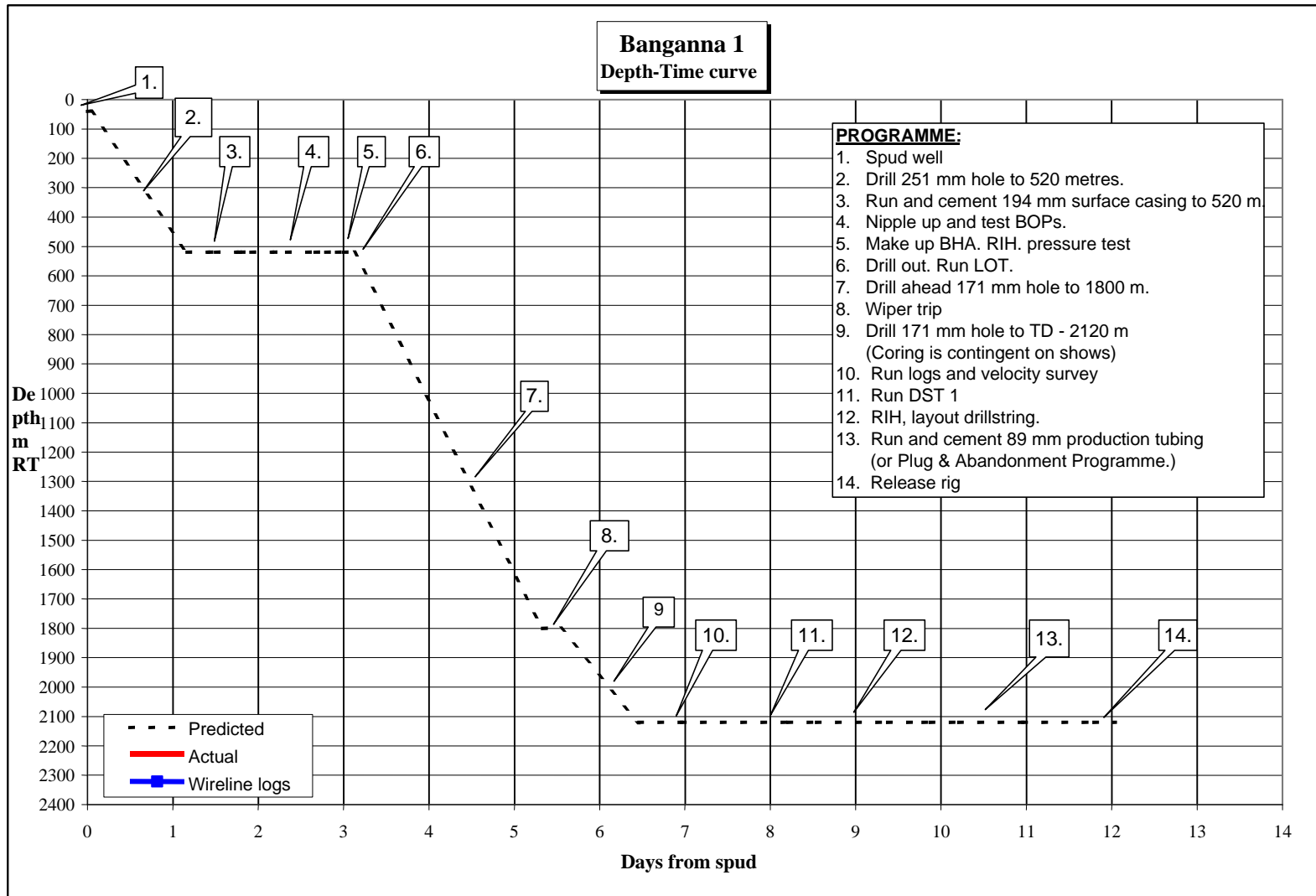
- (i) Build access roads; rig and camp locations; dig and install cellar and conductor.
- (ii) Move in rig and rig up, drill and case mousehole and rathole. Carry out Rig Safety and Environmental Audit Check. Hold pre-spud safety and environmental meeting.
- (iii) Drill well as per the following programme:

Table 5: Drilling Programme and Estimated Activity Times

	Reference		Hrs	Cum days	Depth MD
	Section	Table			
Rig to spud, drill rathole, mousehole (Pre-set conductor)			0	0.0	40
Drill and case surface hole to 520 m:					
RIH with 251 mm Bit 1 and BHA 1	6.1 & 6.3	6	1	0.0	40
Drill 251 mm hole with Bit 1 (18 m/hr) with surveys			27	1.2	520
Wiper trip, circ, pump hi-vis, POH			6	1.4	520
Layout drill collars			2	1.5	520
Run 194 mm casing	9	9	6	1.8	520
Circulate and condition			1	1.8	520
Cement to surface	9	10	3	1.9	520
WOC			6	2.2	520
Slack off, install A section			4	2.3	520
Nipple up BOPs			8	2.7	520
Pressure test	10	11	3	2.8	520
Drill 171 mm hole to TD:					
RIH with 171 mm Bit 2 and BHA 2	6.2 & 6.4	7	3	2.9	520
Pressure test	9	11	2	3.0	520
Drill out and perform LOT			3	3.1	525
Drill 171 mm with Bit 2 & BHA 2 (25 m/hr)			53	5.3	1800
Wiper trip			5	5.5	1800
Drill 171 mm with Bit 2 & BHA 2 (17 m/hr)			22	6.5	2120
Circulate bottoms up 3-5 m into each basal Laura / Pretty Hill Fm sandstone (conventional coring contingent on shows) then drill ahead	4.4				
Wiper trip, circulate and condition, POH			12	7.0	2120
Evaluate well					
Run wireline logs	4.7		30	8.2	2120
Velocity survey	4.9		8	8.5	2120
Wiper trip, make up and run test tools			20	9.4	2120
Test well (5/60/240/480) DST 1	4.5		10	9.8	2120
Reverse circulate			2	9.9	2120
Trip and layout test tools			8	10.2	2120

	Reference		Hrs	Cum days	Depth MD
	Section	Table			
RIH, layout drillstring	11	13	18	11.0	2120
Run plugs			12	11.5	2785
Clean & dump tanks, release rig			6	11.7	2785
Or case and suspend well	9.2	9 & 10			
Run 89 mm tubing and cement			20	11.8	2120
Clean & dump tanks, release rig			6	12.0	2120

Figure 4: Proposed Drilling Time/Depth Curve



5.5. Potential Hazards

The following potential hazards have been identified:

Potential Hazard	Potential Consequences	Actions Required/ Contingency Planning
Surface Basalt, prognosed to be 40 m thick	Slow drilling	Conductor will be pre-set to 40 m using Sides Engineering drilling rig.
Uncontrollable losses in surface hole to fractures/ caverns in the Port Campbell Limestone	No circulation to surface – unable to clean hole	The mud density will be kept as low as possible. Lost circulation additives will be available and used if required. If necessary a cement pill will be pumped to cure the losses.
Dilwyn Formation sands are regional aquifer	Contamination of aquifer	Surface casing will be set below the Dilwyn Formation and cemented back to surface. Drilling fluids used in surface hole section will be free of potential aquifer contaminants such as KCl.
Base Eumeralla may be intersected within structural closure and contain hydrocarbons	Take kick on entering reservoir	Surface casing will be set in the Pember Mudstone and BOPs installed before drilling the Eumeralla Formation.
Shallow Paaratte Fm sands below surface casing shoe may be weak	Fluid losses while drilling	Mud additives to cure losses. Worst case is intermediate casing must be set above target in upper Laira Fm.
Elevated formation pressure due to presence of gas column, maximum mapped closure height = 85 m	Take kick on entering reservoir Induce kick while tripping	Perform LOT 5m into new formation below surface casing shoe. Monitor kick tolerance while drilling ahead. Flow check all drilling breaks. Minimum mud density at base Laira/Pretty Hill Fm to be 1.08 SG. Monitor trip volumes.
Permeable reservoir sand	Differential sticking	Mud density will be maintained as low as practical. Stabilizers will be incorporated in the drill string.

6. BITS, HYDRAULICS AND BHA

Banganna 1 will be drilled as a vertical well. The formations are interpreted to dip at approximately 2.0 – 2.5° to the NNE above the fault, and 3.5 – 4.5 ° to the NE below the fault. No attempt will be made to control the tendency of the bit to walk updip.

A stabilised BHA will be used in the 171 mm hole section.

6.1. 251 mm (9 7/8 ") Hole

Use Bit 1 and BHA 1 to drill to the surface casing point. The bit details are:

BIT NO.	MAKE	TYPE	IADC
1	TBA	TBA	135

6.2. 171 mm (6 3/4") Hole

Drill out with Bit 2 and BHA 2. A PDC bit will be used with a stabilised BHA to maximise drill rate. Backup bits will be available in case an additional bit run is required to reach TD.

Significant engineering and assessment of offset and historical bit performance has been applied to bit selection. Changes to these selections can be made only with the written permission of the Manager Drilling.

BIT NO.	MAKE	TYPE	IADC
2	TBA	TBA	PDC
3	Hughes	MX-09	437

The rig is equipped with two Gardner Denver PZ-7 triplex pumps. Hydraulics will be designed to maximise motor efficiency and bit HSI.

PUMP	No. 1	No. 2
Type	Gardner Denver PZ-7	Gardner Denver PZ-7
Stroke		178 mm (7")
Max. Speed Permitted		145 spm
Liners Available		140 mm (5½")
Max. Pressure Permitted		18.7 Mpa (2710 psi)
Pump Output (95% efficiency)		7.91 lpm/stk (2.09 gpm/stk)

6.3. BHA for 251 mm (9 7/8") Hole

BHA 1 will be used in the 251 mm hole, which will be drilled as a vertical section. Only minor hole deviation is expected in the surface hole section. An integral blade stabiliser may be used.

Table 6: Bottom Hole Assemblies (251 mm hole)

BHA No. 1	
1	251 mm Bit
2	159 mm (6¼") Drill Collars
1	251 mm Stabiliser
10	159 mm (6¼") Drill Collars
6	121 mm (4¾") Drill Collars
6	89 mm (3.5") Hevi-wate Drill Pipe
	89 mm (3.5") Grade "S" Drill Pipe (as required)

6.4. BHA for 171mm (6¾") Hole

BHA 2 is a stabilised, rotary assembly and will be used to drill to the total depth of the well.

Table 7: Bottom Hole Assemblies (171 mm hole)

BHA No. 1	
1	171 mm Bit
1	171 mm Near Bit Stabiliser
24	121 mm (4¾") Drill Collars
6	89 mm (3.5") Hevi-wate Drill Pipe
	89 mm (3.5") Grade "S" Drill Pipe (as required)

Note – A shock sub will be considered when drilling with 171 mm tricone bits.

7. DEVIATION REQUIREMENTS

Location tolerance at the target is a radius of 100 m from the target, with dogleg severity of less than 5 °/30 m.

Spud – 520 m Inclination only surveys will be run on slickline every 150 metres up to and including casing point. Deviation should not exceed 1° at casing point.

520 m – T.D. Inclination only surveys will be run on slickline every 150 metres up to and including TD.

8. MUD PROGRAMME

8.1. 251 mm (9' ") Hole

Drill out with a Gel spud mud. If the local ground water is high in hardness salts, it should be pre-treated with Soda Ash prior to Gel additions. Maintain viscosity with native clays supplemented with Gel additions. If the native clays do not yield significant viscosity, a small addition of PAC may be beneficial. Lost circulation is possible in this area into the Port Campbell Limestone, although no losses were experienced on Taralea 1 and Killara 1. Initial losses may be treated with LCM, either direct to the mud system or spotted as a pill. LCM pills can be formulated using 30 - 40 ppb Gel with a minimum of 20 ppb of LCM. Mica and Kwik Seal, in combination, are the recommended LCMs. The pump strainers may need to be removed. If losses are severe a cement pill may be considered. LCM may also be added to the cement slurries.

The basal part of the Gellibrand Marl is a “gumbo” claystone, with mud rings possible while drilling with fresh water mud. KCl additions are not permitted in this section due to potential aquifer contamination. The mud should be watered back prior to drilling into this zone to minimise the impact of mud rings.

While drilling this section, the density should be kept to a minimum by running the finest possible shaker screens and running all the solids control equipment. The ability to limit drill solids may be diminished if there is a need for significant quantities of LCM in the system. The pH should be maintained at 9.0 with Caustic Soda or Soda Ash. The hole should be circulated clean and a wiper trip made to surface prior to running the casing.

8.2. 171 mm (6¾") Hole

Drill out the cement and shoe with water, using only the pill tank for surface volume. After drilling through the shoe, displace the hole to KCl - PHPA fluid, dumping the cement contaminated water to the sump. Run a leak-off test after drilling 3 - 5 m of new formation. The initial mud composition will include approximately 3 - 4% KCl, with a minimum of 0.5 ppb PHPA powder. The PAC level will be approximately 0.5 ppb and will be gradually increased to reduce the filtrate loss. The filtrate loss will be initially high but will reduce as mud solids increase. The filtration rate target will be less than 7 ccs / 30 min. As the initial mud begins to shear, the PHPA level can be raised to 1.25 - 1.75 ppb on a dry powder basis. This will be achieved by adding at least 2 ppb PHPA into the premix additions. All volume additions to the system should be as pre-mixed KCl - PHPA fluid. The pH should be maintained at 9.0 - 9.5 with Caustic Potash or Caustic Soda, the Sulphite level at 100 ppm to minimise corrosion and any excess Hardness might be treated out with

Soda Ash or Sodium Bicarbonate. Biocide should be added as required, to preserve the system against bacterial degradation.

The mud rheology will be monitored closely to ensure good hole cleaning, as the possibility of fast ROPs could lead to a heavy cuttings loading in the annulus. XCD Polymer may be used to give initial rheology control. In a vertical section, a Yield Point of around 12-15 lbs / 100sq ft should give good hole cleaning, provided the annular velocities are adequate. When using significant quantities of XCD Polymer, PAC LV may be substituted for filtration control so that the mud viscosity does not become excessive.

Solids control will be of prime importance in this section to keep drill solids to a minimum. This will entail running the finest possible shaker screens, dumping solids from the sand trap and running the desilter (providing fluid loss is not excessive). It is aimed to keep the MBT level below 15 ppb equivalent clay. The mud density will most likely be in the 1.08 - 1.12 SG range. The density may have to be raised, depending on the suspected formation pore pressures.

When running production casing, the mud left in the casing/open hole annulus should be treated with biocide to reduce bacteria and the pH should be increased to at least 10 to minimise corrosion. An oxygen scavenger or proprietary corrosion control additive may also be considered. The production casing may be displaced with brine and, if so, a corrosion inhibitor should be added.

Table 8: Mud Type by Interval

Interval (Hole Size)	Weight (SG)	Viscosity	Api Fluid Loss (cc)	Mud Type
0 - 520 m 251 mm (9? ")	Minimum	32 - 45 or as needed Raise to 45+ prior to casing	N/C	Spud with Gel spud mud. Use hivis, LCM pills as required if loss of returns is encountered. Spot cement plugs if necessary to achieve circulation. Maintain a pH of 9.0 with Caustic Soda. Run all solids control equipment to minimize drill solids and mud density. Keep mud viscosity low prior to the Gellibrand Marl to limit mud ring formation.
520 m - TD 171 mm (6¾")	1.08 - 1.12 or as required to control formation pressure Minimum of 1.08 SG prior to the base Laira/ Pretty Hill Fm Sst	35 - 45	Initially high reducing down to 10 cc by 800 m and <7 cc by 1200 m.	Drill out with water. Displace to 3 - 4% KCl - PHPA fluid with adequate PHPA to provide good solids encapsulation (1.25 - 1.75ppb). PAC can be added to gradually reduce the filtrate loss. Initial viscosity and low-end rheology may be supplemented with XCD Polymer. Run all solids control equipment to minimize density and drill solids build up. Control the pH at 9.0 - 9.5 with Caustic Soda or Caustic Potash. Add oxygen scavenger and Biocide as required.

NB: Additions of any diesel or hydrocarbon based chemicals MUST be first discussed with the wellsite geologist and the Brisbane Office. Subsequently, such additions must be fully documented.

9. CASING AND CEMENTING DETAILS AND DESIGN

Table 9: Casing Details and Design

STRING DETAILS	CONDUCTOR	SURFACE CASING	PRODUCTION CASING
Hole Size	445 mm (17½")	251 mm (9")	171 mm (6¾")
Casing Size	340 mm (13")	194 mm (7⅝")	89 mm (3½")
Setting Depth	40 m MD	520 m MD	2120 m MD
Grade	K55	L80	J55
Weight	101.19 kg/m (68 lb/ft)	39.28 kg/m (26.4 lb/ft)	13.84 kg/m (9.3 lb/ft)
Connection	BTC	BTC	EUE
Optimum Torque	-	-	2280
Strength <ul style="list-style-type: none"> Burst psi Collapse psi Tension lbs 	conductor pipe only	6020 3400 602,000	6980 7400 142,000
Safety Factor <ul style="list-style-type: none"> Required Actual Load Design 	conductor pipe only	1.25/1.125/1.8 2500/639/106646 2.41/5.323/5.64	1.25/1.125/1.8 3000/1521/78638 2.33/4.866/1.81
Design Assumptions <ul style="list-style-type: none"> Burst Collapse Tension 	conductor pipe only	Pressure test @ 2.5M Displace cement w/ 1.0 SG fluid Running casing, 1° dogleg severity	Pressure test @ 3.0M Displace cement w/ 1.0 SG fluid Running casing, 3° dogleg severity from surface, 15klb shock load/overpull
Float Equipment	-	Float shoe, NR float collar one joint off bottom	Float shoe on bottom, float collar one joint off bottom
Wiper Plugs	-	Top	Top and bottom
Centralising	-	At mid first joint and on 3 rd and 5th joints above shoe 2 cement baskets (⅓ and ⅔ from shoe)	At mid first joint and on 3 rd and 5th joints, every joint from 30 m above and below pay zones
Accessories	-	194 mm (7⅝") casing head	279 mm (11") x 89 mm (3½") slip and seal assembly.
Threadlock	-	Shoe through to 1 st connection above float collar	Shoe through to 1 st connection above float collar
BOP Test Pressure	-	17500 kPa (2500 psi)	21000 kPa (3000 psi)

9.1. Surface casing procedure - 251 mm (9 7/8") hole - 194 mm (7 5/8") casing

- (1) On reaching casing point, circulate hole clean, P.O.O.H. Any tight spots, ream out and clean to bottom.
- (2) Install guide shoe on bottom joint of 194 mm (7 5/8") casing. Insert float collar between first and second joints and threadlock these joints together with the second and third joints.
- (3) Install bow type centralisers at approximately mid first joint, secured with lock ring, and around third and fifth couplings.
- (4) Run casing, tag bottom, install cement head and circulate at least the total volume of casing whilst slowly reciprocating through a 7 m stroke. Chain casing down prior to mixing and pumping cement.

NOTE: Casing collar is to be spaced and landed such that the installation of the BOP stack, bell nipple and flow line do not need modification.

9.2. Production Casing Procedure - 171 mm (6 3/4") hole - 89 mm (3 1/2") tubing

Where a well is proved to be productive a 89 mm (3 1/2") tubing string will be run and cemented as a future monobore completion.

- (1) After running wireline logs or testing, run a wiper trip to T.D., circulate hole clean, pull out of hole laying down pipe - strap out, change rams to suit the selected casing size.
- (2) Install float shoe on bottom, followed by 1 joint of tubing, then float collar.
- (3) Centralisers: mid 1st joint and on 3rd and 5th couplings, and over each joint from 30 m below to 30 m above each potential pay zone. Ensure that a lock ring is used to locate the shoe joint centraliser.
- (4) Where programmed, install three scratchers every joint, located securely with lock nails, from 20 m below the OWC to 20 m above, through each potential pay zone.
- (5) Run tubing, tag bottom, install cement head and circulate at least the total volume of the tubing whilst slowly reciprocating through a 7 m stroke. Pressure test all lines and cement.

NOTE: Tubing is to be reciprocated continuously until the cement has been pumped.

Table 10: Cementing Details

	SURFACE CASING	PRODUCTION CASING
Hole/Casing Size	251 mm / 194 mm (9? " / 7? ")	171 mm / 89 mm (6¾" / 3½")
Setting Depth	520 m	2785 m MD
Cement Type	Class G	Class G
Cement Top	Class G / Gel to Surface Neat G to 150 m above casing shoe	Class G / Gel to Surface Casing Shoe Neat Class G to 150 m above Basal Laira/Pretty Hill Fm
Excess	100% in O.H.	10% in O.H. (based on caliper)
Estimated Sacks	275 Class G / Gel 185 Class G	455 Class G / Gel 210 Class G
Basis of Calculation	Gauge + 100%	Gauge + 15%
Slurry Density	13.2 ppg Lead 15.8 ppg Tail	13.2 ppg Lead 15.8 ppg Tail
Mix Water	Fresh	Fresh
Additives	Lead – 8% Gel (2.5% pre-hydrated), 0.2% CFR3	Lead – 8% Gel (2.5% pre-hydrated), 0.2% CFR3 1.2% Halad 322 in neat cement Final composition may alter with lab testing of m/u water
Bump Plug Pressure	7000 kPa (1000 psi) above final pumping pressure	7000 kPa (1000 psi) above final pumping pressure

9.3. Surface casing cementing procedure - 251 mm (9 7/8") hole - 194 mm (7 7/8") casing

- (1) Pressure test all lines to 14,000 kPa (2000 psi) for 5 minutes.
- (2) Mix required sacks of Class G and pump to hole at between 4.0 - 4.5 BPM, release top plug. Note: if gel cement is programmed and pre-blended gel cement is not available, it will be necessary to pre-hydrate the gel in the cement mix water. 8% pre-blended gel cement by weight of cement is equivalent to approximately 2.5% pre-hydrated gel by weight of water.
- (3) Displace with water and bump plug with 10500 kPa (1500 psi) or a minimum 7000 kPa (1000 psi) above the final pumping pressure. After 15 minutes, release pressure.
- (4) W.O.C. a minimum of 6 hours.

9.4. Production Casing Cementing Procedure - 171 mm (6 3/4") hole - 89 mm (3 1/2") tubing

- (5) Pressure test all lines to 28,000 kPa (4000 psi) for 5 minutes.
- (6) Mix sufficient preflush brine with 6 kg SAPP/bbl to fill 450 m annulus, calculated from wireline caliper, when displacing. The density of the brine must be at least equal to the mud weight equivalent of the permeable zones. Pump preflush, release bottom plug.
- (7) Mix and pump cement slurry reciprocating slowly through a 6 m stroke.
- (8) Ensure cement lines are cleared prior to dropping top plug in 89 mm (3 1/2") tubing. Release top plug and displace with water or brine.
- (9) Bump plug with 7000 kPa (1000 psi) over final displacing pressure. Hold for 15 minutes. If float does not hold, rebump plug and hold 3500 kPa (500 psi) on casing for 6 hours.
- (10) Lift BOPs, drop and set slips, land casing with 100,000# set down, cut and bevel casing stub, install tubing spool.

10. PRESSURE TESTING AND KICK TOLERANCES

Table 11: Pressure Testing Requirements for BOPs

EQUIPMENT	PRESSURE (psi)	TIME (minutes)	PRESSURE (psi)	TIME (minutes)
SURFACE CASING				
Casing, Blind Rams, HCR	250	15	2500	15
Choke Manifold				
- Rear Valves	250	5	2500	5
- Mid Valves	250	5	2500	5
- Front Valves	250	5	2500	5
Pipe Rams	250	15	2500	15
Annular Preventer	250	5	1500	5
Kelly Cocks	250	5	1500	5
Kill Line Valves	250	5	2500	5
INTERMEDIATE CASING – WHERE APPLICABLE				
Casing, Blind Rams, HCR	250	15	2500	15
Choke Manifold				
- All Valves	250		2500	5
Pipe Rams	250	15	2500	15
Annular Preventer	250	5	1500	5
Kelly Cocks	250	5	2500	5

A BOP Pressure Test Checklist should be completed and submitted to Brisbane office together with any relevant pressure recording charts.

Table 12: Kick Tolerance Calculations: Base Laira/Pretty Hill Fm Gas Reservoir

KICK TOLERANCE CALCULATION						Weak Point @ shoe	
WELL		NAME		Banganna 1			
		DEPTH (m)		1917			
		HOLE SIZE (in)		6.75			
SURFACE CASING		DEPTH (m)		520			
		ID (in)		6.969			
WEAK POINT		DEPTH (m)		520			
		EMW (ppg)		12.5			
		OMW (ppg)		9.0			
		LOP (psi)		310			
		FrP (psi)		1109			
MUD		OMW (ppg)		9.0			
		PGm (psi/ft)		0.468			
		HSPdp (psi)		2943			
INFLUX		PGI (psi/ft)		0.05706			
RESERVOIR		DEPTH (m)		1917			
		CLOSURE (m)		85			
		PAq (psi/ft)		0.433			
		FmP (psi)		2821			
HW DRILL PIPE		OD (in)		4.75			
or DRILL COLLARS		ID (in)		2			
		LENGTH (m)		220			
DRILL PIPE		OD (in)		3.5			
		ID (in)		2.764			
		LENGTH (m)		1697			
				</			

11. ABANDONMENT

- (i) Should there be no significant hydrocarbon indications, the well will be abandoned by setting cement plugs in the open hole and at the surface, as required by The Petroleum Regulations.

Table 13: Abandonment Programme

Plug No.	Formation	Depth	Sacks of Cement
5	Surface	Surface to 10 m	15
4	Surface Casing Shoe/Paaratte Fm ** test for position	490 to 580 m	75
3	Nullawarre Greensand	630 to 690 m	50
2	Flaxmans/Waarre Fms	690 to 750 m	50
1	Base Laira/Pretty Hill Fms	1890 to 1980 m	75

The final plugging programme will be advised after wireline logs have been run and evaluated.

ABANDONMENT WILL NOT COMMENCE WITHOUT
APPROVAL FROM THE BRISBANE OFFICE OF OERL.

FINAL APPROVAL OF THE ABANDONMENT PROGRAMME
MUST BE OBTAINED FROM THE MINERALS AND PETROLEUM DIVISION
OF THE DEPARTMENT OF PRIMARY INDUSTRY

- (ii) Should there be significant indications of hydrocarbons on wireline logs and it is decided to complete the well as a producer, the Production Department will issue an appropriate completion programme.

12. COMMUNICATIONS

The drilling of this well is to be managed by Oil Company of Australia Limited (A.B.N. 68 001 646 331), an Origin Limited company, on behalf of Origin Energy Resources Limited (OERL). All communications with respect to the drilling activity and rig issues should be directed to the OCA Operations Geologist in the Brisbane office.

12.1. OCA (Drilling Manager)

OIL COMPANY OF AUSTRALIA LIMITED

Ground Floor, South Court, John Oxley Centre

339 Coronation Drive

MILTON Qld 4064

Tel: (07) 3858 0600

Fax: (07) 3369 7840

Log Fax: (07) 3367 1019

		Work	AH	Mobile
Operations Geologist	Severino Simeone	(07) 3858 0637		0419 142 896
Manager – Drilling	Ross Naumann	(07) 3858 0622	(07) 3420 4150	0413 584 661
Drilling Superintendent	Ernie Trethowan	(07) 3858 0233	(07) 3263 9659	0407 692 123

12.2. OERL (Prospect Operator)

ORIGIN ENERGY RESOURCES LIMITED

Ground Floor, South Court, John Oxley Centre

339 Coronation Drive

MILTON Qld 4064

Tel: (07) 3858 0600

Fax: (07) 3369 7840

		Work	AH	Mobile
Project Geologist	Andrew Constantine	(07) 3858 0279	(07) 3202 5324	0403 496 225
Reservoir Engineer	Joe Parvar	(08) 8217 5744	(08) 8338 7527	0408 712 597
Manager	Jenny Bauer	(07) 3858 0601	(07) 3720 0082	0417 827 355

12.3. Daily Reports

Daily reports covering 0000 - 2400 hours transmitted by 0730 hours Eastern Standard Time, to the Brisbane Office.

12.4. Emergency Response Numbers

Medical	Number
Port Fairy Area	EMERGENCY SERVICES DIAL 000
Warrnambool Base Hospital	03 5563 1666 Ryot St
Port Fairy Medical Clinic	03 5568 1559 28 Villiers St
Poisons Information Centre	13 11 26
Fire	Number
Port Fairy Area	EMERGENCY SERVICES DIAL 000
CFA	03 5568 1146 Port Fairy, fire calls only 03 5568 1088 Port Fairy, enquiries
Police	Number
Port Fairy Area	EMERGENCY SERVICES DIAL 000
Warrnambool	03 5560 1333 Lord St
State Emergency Service	03 5560 1333 (contact police)
Shire	Number
Moyne Shire Council	03 5568 2600
Warrnambool Shire Council	03 5564 7800

12.5. Emergency Reporting Numbers

	Name & Position	Work	Home	Mobile
1	OCA Operations Geologist - 24 HRS on call			0419 142 896
2	Ross Naumann Manager-Drilling, OCA	07 3858 0622	07 3420 4150	0413 584 661

12.6. OCA/Origin Management Contact Numbers

Name & Position	Work	Home	Mobile
Paul Elkington General Manager, OCA	07 3858 0678	07 3858 0617	0418 745 085
Ernie Trethowan Drilling-Superintendent, OCA	07 3858 0233	07 3263 9659	0407 692 123
Jenny Bauer Manager, Exploration Eastern Australia Origin Energy	07 3858 0601	07 3720 0082	0417 827 355
Rob Willink General Manager, Exploration	07 3858 0676	07 3374 4689	0407 723 050
John Piper General Manager Exploration & Production	07 3858 0681	07 3286 7881	0419 701 115

12.7. OCA/Origin Offices

	OFFICE	Phone:	Fax:
1	OCA/Origin Brisbane	07 3858 0600	07 3369 7840

12.8. Government & Joint Venture Contact Details

Communication with the Government will be through the Brisbane office only. Verbal communication with the Joint Venture will be through the Perth Office only unless otherwise directed.

Government	Number
Minerals and Petroleum Division of the Department of Primary Industry 8 th Floor, 250 Victoria Parade FITZROY VIC 3065	Reports to be emailed to: Kouroshe.mehin@nre.vic.gov.au bruce.armour@nre.vic.gov.au 03 9412 5082 (phone) 03 9412 5156 (fax) 03 9840 1079 (home) 0419 597 010 (mobile)

Joint Venture	Number
Essential Petroleum Roger Blake	03 9699 3009 (work) 03 9387 3803 (home - week) 03 5236 3246 (home - weekend) 0417 011 872 (mobile)
Wally Westman	03 9699 3009 (work) 03 5147 2049 (home) 0418 362 788 (mobile)

12.9. Contractor Contact Details

Company	Contact	Work	Facsimile	A/H
Australian DST	Craig Thorne	07 4622 2655	07 4622 1159	0408 063 465
Century Drilling Limited	Len Dann	07 3879 3333	07 3879 3322	0417 625 928
	Quentin Robson	07 3879 3333	07 3879 3322	0403 187 731
	Doug Alford (HSE)	07 3879 3333	07 3879 3322	0413 019 078
Geoservices Overseas S.A.	Jan Pieniazek	08 9250 2010	08 9250 2715	08 9250 2010
Halliburton	Paul Larkins	07 4622 4599	07 4622 3674	0418 832 884
IDFS	Mark Scheide	08 9325 4822	08 9325 1897	0418 913 873
K & S Freighters	David Whitehead	03 5523 4144	03 5523 5647	0419 829 792
Petroleum Support Services	Chris Annear	08 8723 2082	08 8724 9305	0407 338 228
Reeves Wireline	Dave Collecott	07 3881 1969	07 3881 0005	0419 704 467
	Tony Hill	07 4622 5303	07 4622 5372	0419 675 628
RMN	Andre Skujins	08 8338 7266	08 8338 7277	0428 833 872
Schlumberger	Aruna Subramanian	08 9420 4879	08 9322 3110	0419 044 916
	Jock Munro	07 4622 2499	07 4622 4033	0419 027 246
Walter J. Melis Earthmoving	Walter Melis	03 5562 6259	03 5562 6259	0419 598 338
		03 5562 1025	035562 1025	