EAGLE BAY
RESOURCES N. L.

NORTHRIGHT – 1
Vic/P41

Drilling and Geological Program

March 2001

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1. GENERAL

1.1 Data Summary

Well name:	Northright – 1
Permit:	Vic/P 41
Objective:	Latrobe Group Sands
Seismic Line:	EBR 99-4 SP 210
Location:	Lat: 149° 08' 58.72"E Long: 37° 55' 57.57"S Easting: 5 799 463mN Northing: 688 917mE
Australian Map Grid:	UTM Zone 55
Target:	100m radius from surface location
Rig Position Tolerance:	25m radius from surface location
Planned Rig Heading:	270°
Block Equity Percentage:	Eagle Bay Resources NL (100%)
Type of Well:	Vertical Exploration
Anticipated Spud date:	1st May 2001
Estimated Time to Drill:	8 days
Proposed Total Depth:	500mSS
Water Depth:	~105m
RT above MSL:	25m
Drilling Contractor:	Diamond Offshore General Co
Drilling Unit:	Ocean Bounty
Attendant Craft:	Pacific Conqueror Pacific Sentinel Bell 412 helicopter

1.2 Geological Prognosis

Northright is a reverse faulted structural trap set up by compression against a major east-west trending basin margin fault. The P50 structural closure is approximately 10 km. Northright is located on a lightly exposed inshore basin terrace on the northern side of the prolific Gippsland Basin. The prospect is updip of known oil and gas accumulations, Sole and Leatherjacket, which are full to structural spill.

Oil migration to the Northright prospect is supported by the distribution of known oil and gas fields, regional structural mapping and the presence and distribution of Airborne Laser Fluorescence (ALF) anomalies and oil slicks. Northright is interpreted to be on a significant northeast oil migration path out of the basin.

Within the VIC/P-41 permit is a retention lease covering the Sole (Shell 1973) accumulation. Sole contains a 56 m dry gas column with an interpreted 10 m oil leg contained within the high reservoir quality Latrobe Group sands. The Sole structure is interpreted to be full to spill with oil displaced to the north by Late Miocene tilting and a late dry gas charge from the basins central deep, located immediately south of VIC/P-41.

The Leatherjacket (Esso 1986) accumulation contains two oil columns totalling 33 m. The Leatherjacket structure is also full to spill with the spill direction in the Northeast towards Northright. The oil recovered at Leatherjacket is between 23 and 25 API and is only moderately biodegraded.

1.3 Purpose and Objectives

Northright – 1 is a vertical well intended to test the hydrocarbon potential of the fault dependent closure at the top of the Latrobe Group.

1.4 Location and Transportation

The Northright – 1 well is located in Vic/P 41 approximately 17kms offshore, 104 NM from Sale and 63 NM from Eden, the proposed shore base.

The distance that will be travelled by the boats between the location and Eden is ~90NM resulting in a sailing time of ~9 hours one way.

Crew changes will take place out of Sale. Personnel will be transported by road to Sale and transported to the rig via a Bell 412 helicopter. Flying time between Sale and the rig is ~52 minutes.

1.5 Elevation, Datum and Water Depth

Datum for all vertical measurements will be Lowest Astronomical Tide (LAT) which is approximately 2m below Australian Height Datum (AHD). The location water depth will be adjusted once the 36" BHA has been set on the seabed prior to spud. The rotary table elevation above sea level is ~25m and all depths will be reported in metres below the rotary table (mRT) corrected for tide.

1.6 Rig Sequence and Operational Structure

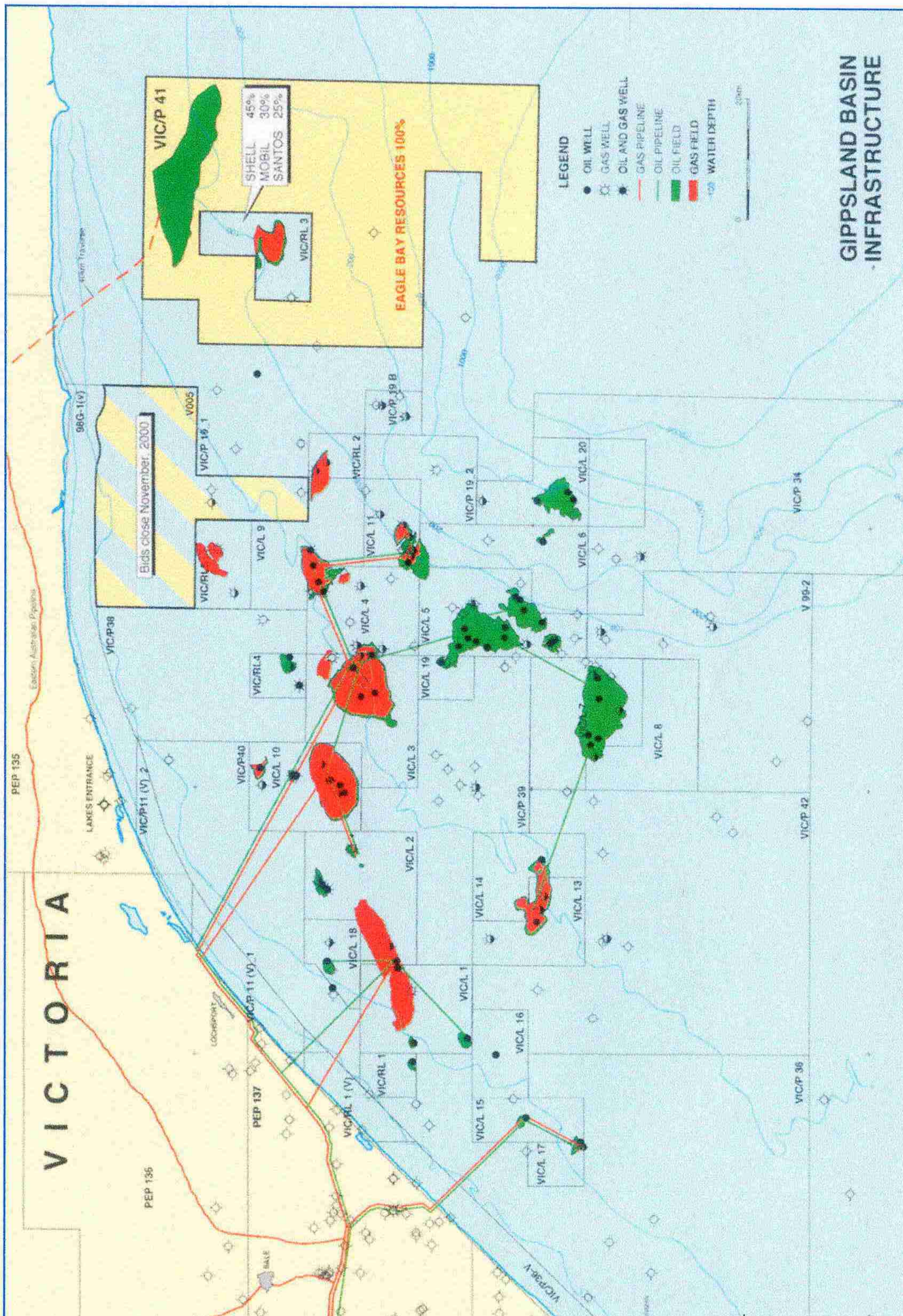
The Ocean Bounty will be towed from a Woodside location in ZOCA to the Northright-1 location in Vic/P 41. The rig and most of the third party services will be assigned to Eagle Bay when the first anchor is down at the Northright-1 location and will be reassigned back to Woodside when the last anchor is racked at the completion of the well.

Well construction design and operational procedures will be conducted in accordance with the following documents:

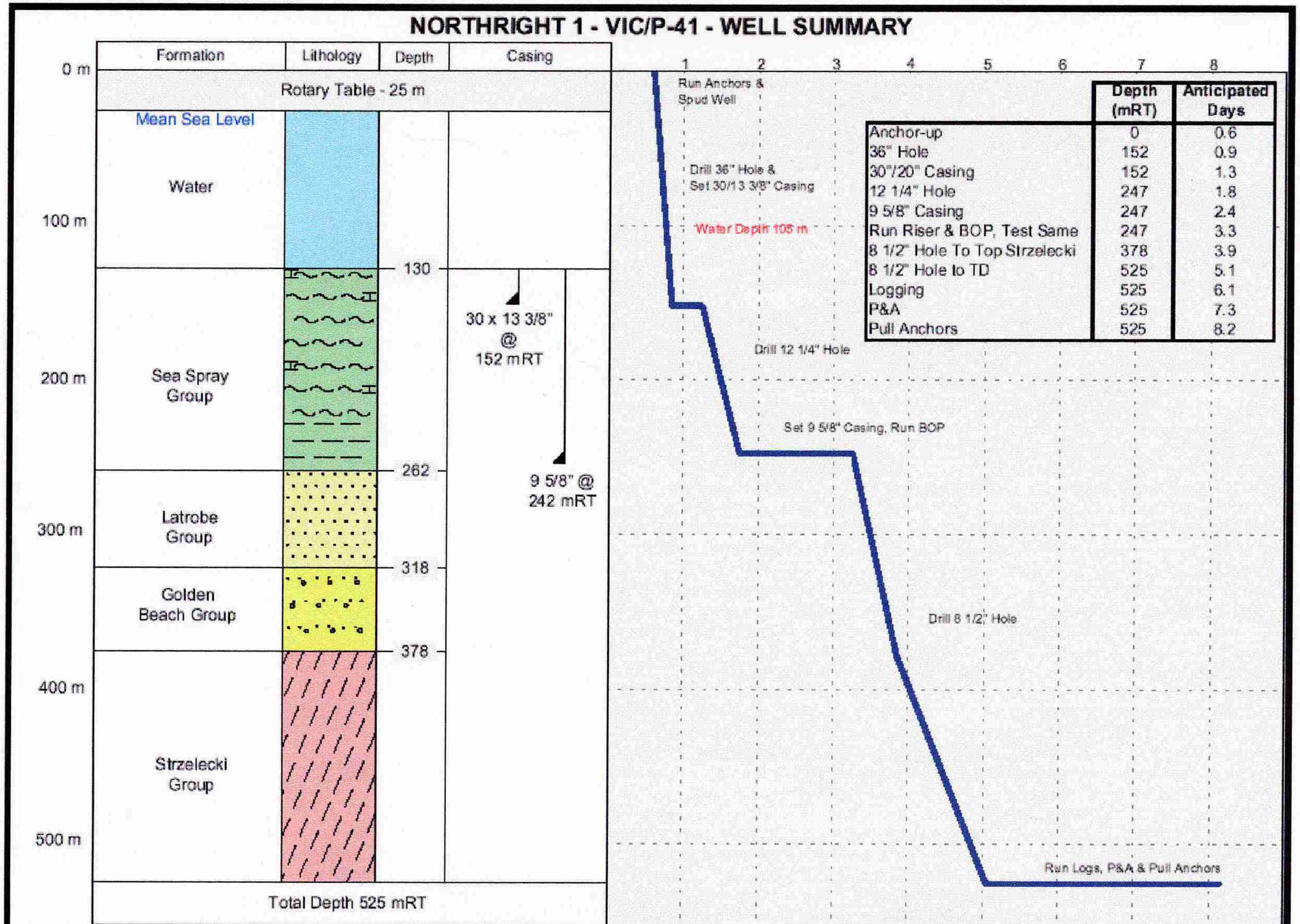
(i) Northright-1 Application to Drill
(ii) Northright-1 Drilling and Geological Program
(iii) Eagle Bay Drilling Procedures
(iv) Semi-Submersible Drilling Unit Operations Manual for the Ocean Bounty
(v) Diamond Offshore Drilling Operations Manual
(vi) Diamond Offshore Well Control Procedures
(vii) Diamond Offshore Ocean Bounty Vessel Safety Case
(viii) Eagle Bay Resources HSE Management System Guidelines
(ix) Eagle Bay Resources Emergency Response Management Manual
(x) Eagle Bay Resources Location Specific Oil Spill Contingency Plan
(xi) APPEA Guidelines for Lifting Equipment, March 2000
(xii) Petroleum (Submerged Lands) Act

2. FIGURES

2.1 Location Map

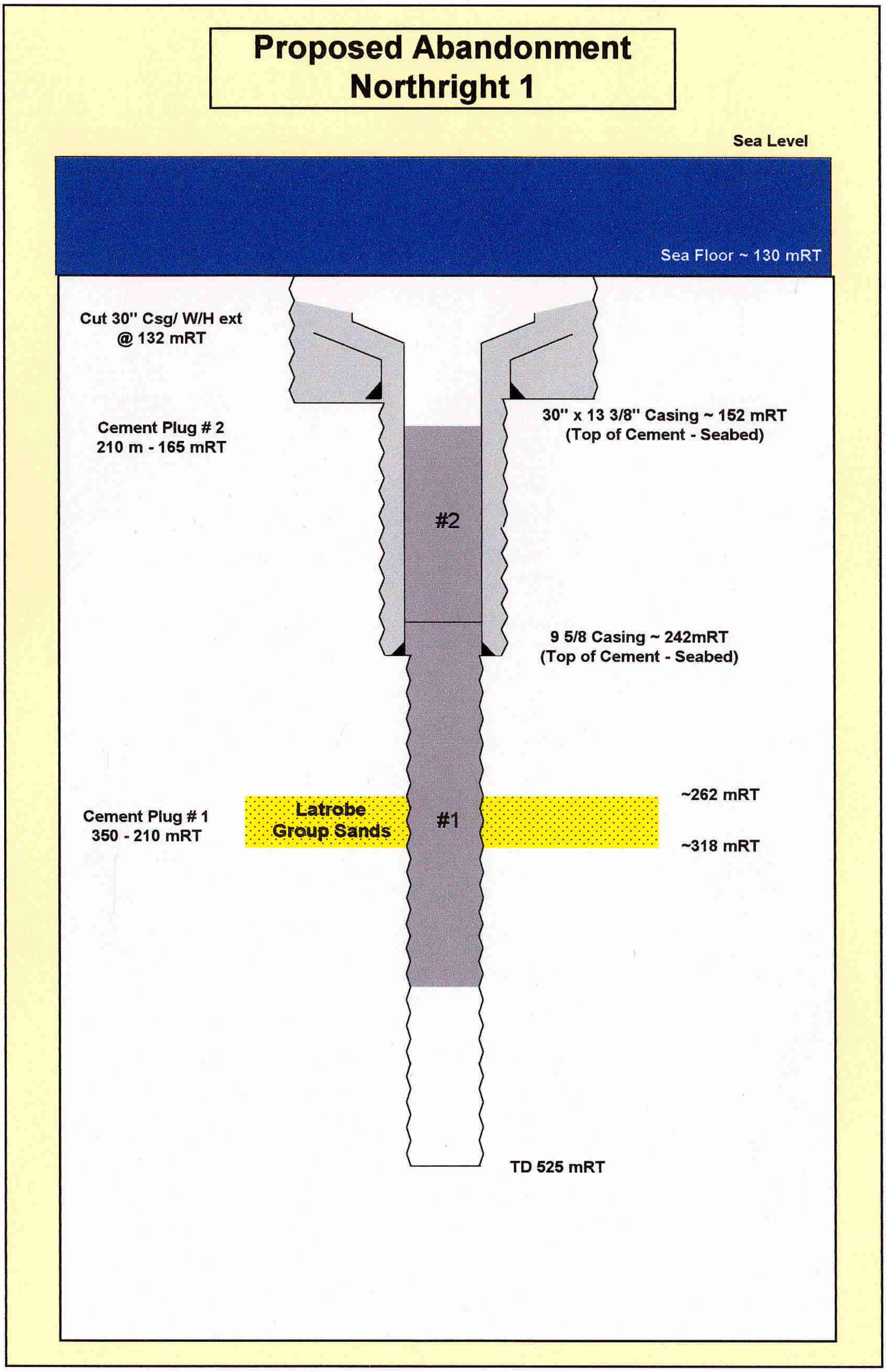


2.2 Time vs Depth Curve



	Depth (mRT)	Anticipated Days
Anchor-up	0	0.6
36" Hole	152	0.9
30"/20" Casing	152	1.3
12 1/4" Hole	247	1.8
9 5/8" Casing	247	2.4
Run Riser & BOP, Test Same	247	3.3
8 1/2" Hole To Top Strzelecki	378	3.9
8 1/2" Hole to TD	525	5.1
Logging	525	6.1
P&A	525	7.3
Pull Anchors	525	8.2

2.3 Proposed Abandonment Schematic



3. GEOLOGICAL EVALUATION

3.1 Offset Wells

Northright-1 is located in the Gippsland Basin, Victoria in Exploration Permit Vic/P-41, 17 km south of the Victorian coast line and 180 km east of Sale. The well location is just below the highest point in the mapped structure, which is the upthrown portion of a reverse faulted structural anticline.

Within the Vic/P-41 permit is Vic/RL3 which contains two offset wells to Northright-1, Dart-1 and Sole-1. Both of these wells were drilled by Shell in 1973, Sole is a suspended gas discovery and Dart was a dry hole.

The only well contained in the Vic/P-41 permit is Shark-1, located on the border of Vic/P-41 and Vic/P-19, is a dry hole drilled by Shell in 1982. The most relevant offset well for Northright-1 is Leatherjacket-1 in Vic/P-19, drilled by Esso in 1986. Northright-1 is considered to be an updip equivalent to Leatherjacket-1.

The stratigraphy of Northright-1 is based on the lithology seen in Sole-1, Dart-1, Shark-1 and Leatherjacket-1.

3.2 Mudlogging

Data monitoring services will be in place from spud to TD of Northright-1. Full circulation from the well will not occur until the 9 5/8" casing is run and set (217 mSS) and the BOP and riser are run. Samples will be collected and monitored from this point to TD. The reservoir objective section will be controlled drilled.

3.2.1 Data Engineering Services

Data engineering services will include gas detection and monitoring of drilling parameters as follows;

<u>Gas Detection</u>

- Total Gas Detection
- Chromatographic Analysis (Minimum 2 minute)
- H_2S
- CO_2

<u>Monitoring Drilling Parameters</u>

- Rate of Penetration
- Depth
- Weight on bit
- RPM
- Mud pit levels
- Pump Strokes
- Calculation of lag time
- Formation Pressure Analysis
- Rotary Torque
- Standpipe Pressure
- Shut in Pressures
- Mud Density in and out
- Mud Temperature in and out
- Mud conductivity in and out
- Mud low in and out
- Predicted mud flow in and out

3.2.2 Cutting Samples

The collection of cutting samples will commence after the 9 5/8" casing has been run and set at 217mSS. Samples will be collected at 3 m intervals from the 9 5/8" casing shoe to TD, unless otherwise directed by the Wellsite Geologist. Spot samples will be at the discretion of the Wellsite Geologist. For further details refer to the Formation Evaluation Program.

3.2.3 Mud Samples

Samples of the mud will be taken from the active pit or the return flow line whenever a change to the mud system occurs. A sample of the mud will be taken from the return flow line during the last circulation prior to running wireline logs. This sample will be used for calibrating the wireline log measurements for formation evaluation purposes.

3.3 Wireline Logging Program

All wireline logs will be run by Schlumberger Oilfield Australia.

Wireline logs will be run in Northright-1 if FEWD logs indicate hydrocarbons are present or if the FEWD logs are inconclusive as to the results of the well.

The objectives of the FEWD and wireline-logging program are;
- Determine formation tops
- Determine the presence of hydrocarbons
- If hydrocarbons are present, determine the extent of the hydrocarbon column, mobility of any oil and **obtain oil samples at surface**

<u>Suite 1 Wireline Logging Program – 8 ½" hole – 500 – 217 mSS</u>

The following wireline logs will be run if required in Northright-1

1. PEX-HALS (GR-Lateralog-Density-Neutron)
2. MDT (Pressures & Samples)

Run no. 2 will occur if the FEWD and the PEX-HALS indicate that hydrocarbons are present. If the results of both the FEWD, PEX-HALS and mudlog data are inconclusive, the MDT will be run to obtain a pressure gradient through the reservoir to determine if hydrocarbons exist, and depending on the outcome, recover reservoir fluid samples.

If hydrocarbons are present, the MDT will be run across the Latrobe Group with a priority on obtaining oil samples and determining the mobility of the oil. The MDT program is expected to be extensive in order to prove moveable hydrocarbons. The data from the MDT will replace a DST in Northright-1.

Should the MDT fail, an RFT will provide back up.

3.4 Formation Evaluation While Drilling (FEWD) Logging

The Schlumberger Anadrill CDR-GR tool will be used to record resistivity and gamma ray logs while drilling the 8 ½" hole. The primary objective of running the CDR-GR FEWD is to provide real time evaluation of the formations and to decide on the requirement for TD logging runs.

Listed below are the anticipated bit to sensor depths.

Sensor	Distance Behind Bit
Resistivity	~2.86m
Gamma Ray	~2.93m

3.5 Coring

No coring will be conducted in Northright-1.

4. DRILLING PROGRAM

This section should be read in conjunction with the Eagle Bay Resources Drilling Procedures.

4.1 Drilling Hazards

4.1.1 Potential Gas Hazards

No shallow gas is indicated on the 2D seismic and is not anticipated.

4.1.2 Lost Circulation

Lost circulation is anticipated in the 12 ¼" and 8 ½" hole sections and the procedures to adopt in that event are addressed the Drilling Fluids Program.

4.1.3 Faults

It is not anticipated that the well path will cross any faults

4.2 Rig Mobilisation/Anchoring

The Ocean Bounty comes under contract to Eagle Bay Resources when the first anchor is dropped at the Northright – 1 location and this time will be recorded on the Daily Drilling and IADC Reports.

1. Tow drilling unit to the location and position with a rig heading of 270°
   The required location is
   Lat: 37° 55' 57.57"S
   Long. 149° 08' 58.72"E
   The tolerance on the surface position is 25m radius from the above location.

2. Confirmation of the actual location co-ordinates will be provided by the positioning contractor in conjunction with the Eagle Bay Survey Representative on the rig. Positioning is to include an accurate measurement of vertical elevation with reference to the spheroid and from this the exact elevation of the rotary table is to be recorded with reference to sea level. The tidal state and water depth should be recorded at the times the above measurements are taken. The final co-ordinates are to be reported on the Daily Drilling and IADC Reports.

3. Surface test the 18 ¾" BOP stack as per test schedule in Appendix 1

4. Prepare 30" casing and PGB

4.3 36" Hole /30" Casing

4.3.1 Objective

The objective of the section is to construct a stable hole to accept the 30" conductor which will provide structural support for the wellhead and remaining casing strings.

4.3.2 Hazards

There are no hazards anticipated. If, in the unlikely event that shallow gas is encountered, the rig will be moved off location in an upwind and upcurrent direction. The Diamond Offshore Well Control Procedures will be used if necessary.

4.3.3 Drilling Fluids

The 36" hole will be drilled with seawater and hi-vis sweeps as detailed in the Drilling Fluids Program. The sweeps will be either gel or guar gum. At section TD (~153mRT) the hole will be displaced to prehydrated gel mud. (*Refer to Appendix 5.2*)

4.3.4 BHA

Component	Approx Length (m)	Bottom Connection	Top Connection
26" Tricone bit	0.7		7.5/8" Reg pin
36" hole opener	1.8	7.5/8" Reg box	7.5/8" Reg pin
9 ½" bit sub w/ float	0.7	7.5/8" Reg box	7.5/8" Reg box
X/over	0.7	7.5/8" Reg pin	6.5/8" Reg box
8" DC x 6	54	6.5/8" Reg pin	6.5/8" Reg box
X/over	0.7	6.5/8" Reg pin	4.1/2" IF box
HWDP x 9	81	4.1/2" IF pin	4.1/2" IF box

4.3.5 Survey

Drop Totco at section TD prior to final trip out

4.3.6 Evaluation

Mudloggers to monitor drilling parameters and tide levels. Drilling parameters are to be correlated with drill floor recorders.

4.3.7 Drilling Procedure

(Refer to EBR Drilling Procedures)

1. It is not planned to use a TGB.
2. Deploy ROV. Place first hole marker 2-3m from hole prior to spud.
3. Run 36" BHA and tag seabed with 5000lbs. Note penetration, record water depth and time on the daily Drilling and IADC reports. (Use tide tables to give the tide corrected water depth relative to LAT)
4. Run Totco on sandline and confirm that the drill string is vertical. If angle is >1° pick up and reposition BHA.
5. Spud well using low parameters for the first 10m then increase to drilling parameters as specified in the Drilling Procedures, and the sweep regime recommended in the Drilling Fluids Program. Drill to ~153m or as appropriate for the 30" housing to be ~1.5m above the seafloor.

Note: The ROV should be deployed during this section to observe for indications of shallow gas lost circulation and hole cleaning

6. At TD circulate the hole clean and displace the hole per the Drilling Fluid Program. Pick up until HO is just below the seabed and run back to bottom.
7. Circulate and displace the hole as per the Drilling Fluids Program, drop Totco.

Note: At this time deploy second hole marker with ROV.

8. Pull out to run conductor.

4.3.8 Casing Summary

Size	Qty	Description	Weight/Grade/Conns
30"	1	DQ 30" hsg w/extension joint	1 1/2" WT, X52, SF 60 box down
30"	1	Shoe joint w/ 13 3/8" float shoe.	1" WT, X52, SF 60

No Centralisers

4.3.9 Cement Summary

Displmt	Recipe/excess	From	To	Density (SG)
Spacer	80 bbls Seawater			1.03
Tail/grout slurry	Class "G" + SW $CaCl_2$ 1% bwoc D-Air 0.25gal/10bbl Thickening time 2hrs Excess: 200%	Csg shoe	Seabed	1.91

4.3.10 Run and Cement 30" Casing

1. Run 30" casing and land with the top of the 30" housing ~1.5m above the seabed. Ensure PGB inclination is <1°
2. Circulate a minimum of 1½ times the casing volume of seawater.
3. Cement casing and observe returns with ROV. If returns are not observed continue pumping cement until returns are seen or 200% excess has been pumped.
4. Displace cement to within 5m of the shoe.
5. Observe PGB angle and if necessary adjust rig position so angle is <1.5°
6. Wait until surface samples are firm and slack off weight while monitoring slope indicator. Release running tool and record distance from top of 30" housing to rotary table, PGB angle and heading and observation of returns.
7. Conduct remedial grouting if necessary.
8. Set tide markers and begin recording tide against tide.

4.4 12 ¼" Hole /9 5/8" Casing

4.4.1 Objective

The 12 ¼" hole section will enable the 9 5/8" surface casing to be set in the base of the Sea Spray Group ±20m above the Primary target, the Latrobe Group Sands, which will provide protection during drilling of the reservoir.

4.4.2 Hazards

Shallow gas is not anticipated but the ROV will be deployed on bubble watch and the shallow gas procedures outlined in the Diamond Offshore Well Control Procedures will be in effect while drilling the 12 ¼" hole section.

There is a potential for lost circulation in the carbonates of the Sea Spray Group, which may be observed by the ROV. If lost circulation occurs it will be handled by the addition of LCM to the sweeps and the placement of a LCM pill in the hole prior to running 9 5/8" casing.

It is important to identify the marl section anticipated above the Latrobe Group to set the casing shoe into. This will be achieved by control drilling the section with constant drilling parameters and observing a reduction in penetration rate to indicate lithology change.

4.4.3 Drilling Fluids

The 12 ¼" hole will be drilled with seawater and hi-vis sweeps as detailed in the Drilling Fluids Program. The sweeps will be either gel or guar gum and for ROP's<100m/hr 2 x 30bbl and 1 x 50 bbl sweeps will be pumped per stand. At section TD (~247mRT) the hole will be displaced to a weighted PHG/KCL/Drispac mud which may contain LCM if required *(Refer to Appendix 5.2).*

4.4.4 BHA

Component	Approx Length (m)	Bottom Connection	Top Connection
12 ¼" tricone bit	0.5		6 5/8" Reg pin
8" Bit sub w/ drilled float	0.7	6 5/8" Reg box	6 5/8" Reg box
8"DC x 3	27.0	6 5/8" Reg pin	6 5/8" Reg box
12 ¼" IBStabiliser	1.5	6 5/8" Reg pin	6 5/8" Reg box
8" DC x 2	18.0	6 5/8" Reg pin	6 5/8" Reg box
8" Jar	9.0	6 5/8" Reg pin	6 5/8" Reg box
8" DC x 2	18.0	6 5/8" Reg pin	6 5/8" Reg box
X/over	0.7	6 5/8" Reg pin	4 ½" IF box
HWDP x 9	81.0	4 ½" IF pin	4 ½" IF box

Bit: Varel EDT 115
IADC: 1.1.5
Nozzels: 3 x 18's

Flowrate: 700 gpm

4.4.5 Survey

Drop Totco at section TD prior to trip out

4.4.6 Evaluation

Mudloggers to monitor drilling parameters and tide levels. Drilling parameters to be correlated with drill floor recorders. No formation evaluation or logs will be run in this hole section.

4.4.7 Drilling Procedure

(Refer to EBR Drilling Procedures)

1. Make up 12 ¼" drilling assembly, attach softlines if necessary and run in hole.
2. Drill out 13 3/8" shoe and rat hole and drill ahead using seawater and hi-vis sweeps as per the Drilling Fluids Program.

   Note: The ROV should be deployed during this section to observe for indications of shallow gas and lost circulation.

3. Drill to ~247m or as appropriate for the actual length of the 9.5/8" casing with a 5m rathole. Utilise the ROV to observe returns. Maintain the sweep regime recommended in the Drilling Fluid Program.

   Note: It is important to pick the top of the Sea Spray Group marls in order to establish a suitable casing seat, therefore maintain controlled/fixed drilling parameters in order to determine the change in ROP. The casing must be set at least 15m into the marl section.

4. At section TD circulate the hole clean and displace the hole to PHG mud. Perform wiper trip to the 13 3/8" shoe.
5. Displace hole to PHG/KCL/Drispac mud as specified in the Drilling Fluid Program. Drop Totco and SLM out to run casing, jet 30" wellhead on the way out.

4.4.8 Casing Summary

Size	Qty	Description	Weight/Grade/Conns
9 5/8"	1	DQ 18 ¾" W/H & ext. swaged to 9 5/8" with 6'pup	9 5/8" 47ppf, L80, New VAM pin down
9 5/8"	1	6m pup joint	9 5/8" 47ppf, L80, New VAM
9 5/8"	8	Intermediate joints	9 5/8" 47ppf, L80, New VAM
9 5/8"	1	Float collar joint - Bakerlocked	9 5/8" 47ppf, L80, New VAM
9 5/8"	1	Shoe joint - Bakerlocked	9 5/8" 47ppf, L80, New VAM

Centralisers to be fitted: 2 on shoe joint, 1 on float collar joint

4.4.9 Cement Summary

Displmt	Recipe/Excess	From	To	Density (SG)
Spacer	80 bbls Seawater			1.03
Tail slurry	Class "G" + SW D-Air 3000L 0.25gal/10bbls Thickening time 2 ¾ hrs Excess: 100%	~242m	Seabed	1.91

4.4.10 Run and Cement 9 5/8" Casing

1. Rig up and run 9 5/8" shoe and collar joints and check floats.
2. Run casing with softline on shoe joint. Stab into 30" housing observing with ROV
3. Run casing filling each joint with seawater. Install stabbing guide on last joint.
4. Make up 18 ¾" wellhead/extension joint, with extended wear-bushing installed, to running tool (with 2 joint stinger and plugs below) and make up to the stabbing guide.
5. Land 18 ¾" wellhead in the 30" housing observing with ROV. Confirm latching with 25 kips overpull.
6. Rig up cement lines and pump 80 bbls of seawater.
7. Cement 9 5/8" casing with 100% excess over open hole volume and observe returns with ROV.
8. Displace with seawater, bump plug and pressure up to 2000 psi over circulating pressure to test casing.
9. Check floats are holding and release running tool. Flush wellhead on way out.
10. Check slope indicators on PGB with ROV and record readings.
11. Move rig 15m away from wellhead in direction of current and lay down 12 ¼" drilling assembly.

4.5 Run BOP

1. With the rig off location run the BOP stack and riser per Diamond Offshore procedures testing the K & C lines to 5000 psi.
2. Move rig over wellhead and land and latch BOP. Confirm latching with 50 kips overpull and record slope indicator reading after landing the stack.
3. Run the BOP test plug and test the wellhead connector to 5000 psi and the BOP as per the test schedule in Appendix 1
4. Run a stand of HWDP through rotary table and function test diverter. Ensure the are no blockages by pumping water through system.
5. Function test blind/shear rams. (If plug did not bump pressure test the casing against the blind/shear rams to 2000 psi).

4.6 Drill 8 ½" Hole

4.6.1 Objective

The 8 ½" hole section will enable the primary target, the Latrobe Group Sands, to be fully evaluated. The hole must be drilled with the objective of achieving gauge hole to facilitate the acquisition of pressure data and liquid samples from MDT tools.

4.6.2 Hazards

It is anticipated that the sands of the Latrobe Group will be unconsolidated and subject to washing out, and lost circulation. It will be important to maintain mud rheology and use flow rates specified to avoid washing out the hole. It may be necessary to boost the riser to prevent cuttings build up in the stack.

If lost circulation occurs an attempt will be made to heal the losses by the use of LCM pills and addition of LCM to the mud system as described in the Drilling Fluids Program *(Appendix 5.2)*

The potential to damage the 9 5/8" shoe integrity exists if a LOT is conducted. To avoid the risk of damaging the integrity at the shoe the formation integrity test (FIT) conducted at the shoe will be limited to 1.5 SG, which will be adequate to provide control of the subsequent hole section.

The potential for slumping exists and the hole will be left standing with mud weighted to ~1.15 SG to minimise that risk prior to any wireline evaluation.

4.6.3 Drilling Fluids

The drilling fluid used for this hole section will be a 5% KCL/PHPA/Polymer system designed with the goal of inhibiting any argillaceous components in the formation, maintaining stable gauge hole and minimising excessive filtrate invasion.

It is important to minimise hole enlargement in this section. To maintain laminar flow a flow rate of ±500 gpm is indicated from hydraulics calculations in Appendix 5.5, this should be recalculated using the actual mud and BHA parameters at the time. To achieve adequate hole cleaning with this flow rate maintain the low-end rheology recommended in Appendix 5.2. It may be necessary to boost the riser to avoid cuttings build up in the Stack.

4.6.4 BHA

Component	Approx Length (m)	Bottom Connection	Top Connection
8 ½" tricone bit	0.25		4 ½" Reg pin
6 ½" Bit sub w/ drilled float	0.5	4 ½" Reg box	4 ½" IF box
Anadrill Resistivity/GR	6.9	4 ½" IF pin	5 ½" FH box
Anadrill MWD Power Pulse	7.5	5 ½" FH pin	5 ½" FH box
Anadrill X/over	0.7	5 ½" FH pin	4 ½" IF box
6 ½" DC x 1	9.0	4 ½" IF pin	4 ½" IF box
8 ½" Stabiliser	0.7	4 ½" IF pin	4 ½" IF box
6 ½" DC x 3	27.0	4 ½" IF pin	4 ½" IF box
6 ½" Jars	9.0	4 ½" IF pin	4 ½" IF box
6 ½" DC x 2	18.0	4 ½" IF pin	4 ½" IF box
HWPD x 12	108.0	4 ½" IF pin	4 ½" IF box

Bit:	Varel L 127
IADC:	1.2.7
Nozzels:	3 x 16's
Flowrate:	±500 gpm

4.6.5 Survey

Directional surveys will be recorded by the MWD on every connection.

4.6.6 Evaluation

Mudlogging:	Continuous monitoring of return drilling fluid, drilling parameters, tide and pit levels
Cuttings:	3m sample intervals, washed/air dried
Coring:	There are no cores planned
FEWD:	GR/Resistivity sensors will be run in conjunction with the directional package
Wireline Logging:	If hydrocarbons are encountered a wireline logging program will be conducted.

4.6.7 Drilling Procedure

Note: No conventional coring is planned

1. Lay down 12 ¼" BHA and pick up 8 ½" BHA
2. Run Flex joint wear bushing
3. Tag top of cement in 9 5/8" casing
4. Drill out cement and shoe while displacing to KCL/PHPA/Polymer mud system.
5. Drill 3m of new hole, circulate to ensure even mud weight and pull bit into shoe.
6. Perform a FIT as per Drilling Procedures. Limit test to 1.5 SG MWE. If indications of formation yield are observed terminate test immediately - do not break down the formation.
7. Perform SCR's and CLFLs.

8. Drill ahead to TD with controlled parameters to limit the ROP to enable samples to be collected at the frequency required.
9. At TD (525mRT) the decision will be made to run wireline logs or abandon the well.
10. If wireline logs are to be run circulate and condition hole for logs prior to coming out.

4.7 Abandonment

Note: *The following preliminary program will be supplemented with a detailed and approved program based on the actual well.*

1. Set cement plug #1 from 30m below any hydrocarbon bearing sands to 210m
2. Wait on cement and tag plug #1 to confirm location
3. Set cement plug #2 from 210 – 165mRT)
4. Pull BOP stack.
5. Cut 30" and 18 ¾" wellhead extension at 132mRT, 2m below seabed.
6. Recover casing stubs and PGB.

5. APPENDIX

5.1 Pressure Test Requirements

Item	Requirement	Test Pressure
30" Conductor	None	N/A
9 5/8" Surface casing	Design burst pressure: Pore pressure from 350m in 8 ½" hole	2000 psi
Annular preventers	50% max working pressure	200psi low 2500psi high
BOP Rams	50% max working pressure	200psi low 5000psi high
Standpipe, TDS, IBOP		200psi low 5000psi high
K & C lines		200psi low 5000psi high

Note: All pressure tests will be held for 10 mins

5.2 Drilling Fluids Program

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INTEQ

EAGLE BAY RESOURCES N. L.

DRILLING FLUIDS PROGRAMME

WELL: NORTHRIGHT-1

RIG: OCEAN BOUNTY

LOCATION: VIC/P41

APPROVAL DETAILS

ORIGINATOR (BHI)	PRINT NAME P. Tomkins	TITLE Drilling Fluids Supervisor	SIGNATURE	DATE 20/03/01
APPROVED (Eagle Bay)	PRINT NAME S. Crocker	TITLE Drilling Superintendent	SIGNATURE	DATE

REVISON NO.	VERSION DATE	REF NO.
1	20/03/01	Northright_mud_v1.doc

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1. WELL INFORMATION

1.1 WELL SUMMARY

Well Name :	Northright-1
Well Designation :	Exploration Well
Permit :	VIC/P41
Drilling Contractor / Rig :	Diamond Offshore General Company (DOGC)/ Ocean Bounty
RT - MSL / Water Depth:	25 m / 105 m ±2 m
Primary Objective :	Latrobe formation.
Depth of Objective :	262 mRT (top reservoir)
Well Depth (TD):	525 mRT

Potential Hazards:

Lost circulation	- both static and dynamic losses can be expected throughout the high permeability Latrobe reservoir interval. Losses can also be expected in riserless Gippsland formation.
Borehole breakout	- No unusual risk
Faults	- Northright-1 will be drilled alongside a fault , which runs to the seabed - Hard abrasive drilling potential through Laminaria objective
Temperature	- Maximum expected BHST 30°C @ 525 mRT
Offset wells	- Sole-1, Dart-1. Leatherjacket-1
Environmental	- WBM will be used exclusively. The Northright-1 location is not considered to be environmentally sensitive. Oil is currently seeping onto the seabed at the proposed well locality.

1.2 PREDICTED STRATIGRAPHY

Formation/Unit Tops	Formation Top (m TVDSS)	Formation Top (m RT)	Formation Thickness (metres)
Sea level	0	25	100
Sea floor / Gippsland Lakes Entrance Fm	105	130	
Latrobe Fm	237	262	263
Total Depth	**500**	**525**	

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2. DRILLING FLUID SUMMARY

Hole Depth mBRT	Casing Depth mBRT	Mud Properties	Mud Type	Drilling Fluid Formulations
Sea Bed @ 125 m. 36" @ ~153m.	30"/ 20"cond. @ 152m.	Mud Wt. < 1.08 sg 6 rpm > 40 API FL No Control	**SEA WATER + HIGH VIS SWEEPS** ***Sweeps:*** Prehydrated Gel Sweeps ***TD Displacement:*** Prehydrated Gel @ 1.5 x Hole Volume.	High Viscosity: Freshwater As Required; Soda Ash Hardness < 400 mg/L; Caustic soda pH 8.5 – 9.5; Bentonite 35 to 40 ppb Hole Displacement: As Required; Hardness < 400 mg/L; pH 8.5 – 9.5; 25 to 30 ppb
12¼" hole @~247m.	$9^5/_8$" csg @ ~242m.	Mud Wt. < 1.08 sg 6 rpm > 40 API FL No Control ***@ TD Inhibitive pill*** Mud Wt. = 1.15 sg YP 30 - 50 6 rpm > 15 API FL < 10 ml KCl: 8 % wt/ wt	**SEA WATER + HIGH VIS SWEEPS** ***Sweeps:*** Alternate Guar/PHG • 2 x 4.8 m³ (30 bbl) , 1 x 7.9 m³ (50 bbl) sweeps per stand when ROP < 100 m/hr • 2 x 7.9 m³ (50 bbl) sweeps per std when ROP > 100 m/hr. ***These are guidelines; hole conditions and drilling parameters should dictate actual sweep regime.*** ***TD Displacement:*** Prehydrated Gel @ 1.5 x Hole Volume. ***Inhibited TD Pill*** Spot Weighted (1.15 sg) Gel / KCl / Drispac inhibited pill on bottom across "Lakes Entrance" marl	High Viscosity Pills: Freshwater As required; Soda Ash Hardness < 400 mg/L; Caustic Soda pH 8.5 – 9.5; Bentonite 35 to 40 ppb; Drispac SL Hole Displacement: As required; Hardness < 400 mg/L; pH 8.5 – 9.5; 25 to 30 ppb; 0.75 to 1.0 ppb Sea Water As required Guar Gum 4.0 ppb KCl 30.0 ppb Drispac R 0.5 to 1.0 ppb
8½" hole T.Depth @~525 m.		Mud Wt: 1.13 – 1.16 sg 6 rpm: 8 - 12 API FL: < 5 mL KCl: 5 % wt/ wt The mud weight will be initially controlled at <1.15 sg. (Offsets indicate mud weights of 1.20 sg or above may be required. Only raise mud weight if hole conditions dictate	**KCl/PHPA** • Lost circulation may be a problem, therefore 100 bbls of LCM pill #2 shall be prepared prior to drilling out the $9^5/_8$" shoe track. • Observe cuttings integrity at shakers at all times. If shards or splintered cuttings present initiate weight up immediately. • Add 8 sxs of graded calcium carbonate (4 sxs Circal 1000 & 4 sxs Circal Y) per stand on penetrating the Latrobe formation at +/- 265 m to facilitate bridging and mitigate spurt and seepage losses.	Products – Concentration 1 bbl Alcomer 120 1.0 ppb Newdrill L 1.5 ppb Drispac R 0.5 ppb Drispac SL 1.0 ppb Flowzan 0.75 ppb KCl (5%) 18.0 ppb Mil-Gel 3.0 ppb Circal 1000/ Y As per program Barite As required

3. POTENTIAL HOLE PROBLEM SUMMARY

Hole Details	Formations Tops	Potential Hole Problems	Proposed Counter Measures
Seabed 125 m 36" Hole ~153m.	Gippsland	• **Soft Seabed:** seabed erosion and unstable TGB. • **Hole Stability:** Unconsolidated / Fractured formations. Low potential for hole collapse/slump based on offsets. High ROP. Potential for ledges.	• Drill first 10 m with PHG. • Pump ~100 bbls sweep per std, and displace hole to PHG at TD. Offsets have not required LCM or Barite in sweeps or hole displacement PHG.
12¼" Hole ~247 m.	Gippsland Lakes Entrance	• High ROP – Hole cleaning / Packoff • Lost circulation in faulted/fractured, normally pressured carbonates. • **The $9^5/_8$" csg will be set in the "Lakes Entrance" marl at the base of the Tertiary.** This formation is typically a calcareous claystone (Marl) which becomes "sticky" when exposed to uninhibited WBM	• Losses can be reduced with LCM in sweeps and hole displacement PHG. • Any time the pipe is tripped (e.g. bit change, logging, running casing, wiper trip) the hole should be filled with PHG displacement mud. • Sweep schedules need to be tailored to ROP, typically; 110 bbl High vis sweep per stand @ ROP < 100 m/hr 100 bbl High vis sweep per stand @ ROP > 100 m/hr • Maintain high viscosity and optimise pump rate to ensure hole cleaning at lowest flowrate • Displace open hole 1.5 times hole volume with inhibited mud .
8½" Hole ~525 m.	Lakes Entrance Latrobe	• **Water Sensitive Claystone:** This Claystone becomes "sticky" if drilled with an uninhibited mud system. • Pack-off/Stuck Pipe. • **Losses:** likely with ≥1.15 sg mud wt.	• All of the offsets have successfully used both WBM. This interval will be drilled with a KCl/PHPA mud system. Great emphasis is placed on ensuring that all mud properties are maintained strictly in spec throughout this interval. • Displace hole to KCl/PHPA system whilst to drilling out 9 $^5/_8$" casing shoe. Pretreat the mud with Sodium Bicarbonate, will minimise any contamination from cement. • The mud weight at the beginning of this interval will be 1.10 – 1.15 sg. It should be increased to only to counter overpressure and/or wellbore instability. • While drilling the high permeability Latrobe reservoir sands, 3 x 25 kg sxs of Circal Y 3 x 25 kg sxs of Circal 60/16 and 3 x 25 kg sxs of Chekloss should be added to the active for every stand drilled.

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4. OFFSET WELL REVIEW

FORMATIONS AGES	Sole-1 VIC/P22	Dart-1 VIC/P41	Leatherjacket-1 VIC/P41
Recent To Miocene	**Seabed @ 138 mRT** **S/W & Sweeps** 30" @ 144 m	**Seabed @ 134 mRT** **S/W & Sweeps** 20" @ 251 m	**Seabed @ 127 mRT** **S/W & Sweeps** 20" @ 254 m
Oligocene / Eocene	**SEAWATER/GEL/DRILLED SOLIDS** • 1.03 – 1.08 sg • API Fl No control • PV 3- 4 cP ➢ 6 rpm 15 – 20 lbs/100ft² • Hole in Good condition • Allowed mud weight to rise with drilled solids. Drilled predominantly siltstone grading to marl at the shoe 20" @ 290 m	**SEAWATER/GEL/DRILLED SOLIDS** • 1.03 – 1.08 sg • API Fl No control • PV 3- 4 cP ➢ 6 rpm 15 – 20 lbs/100ft² • Hole in Good condition • Allowed mud weight to rise with drilled solids. • Drilled predominantly siltstone grading to marl at the shoe $10^{3}/_{4}$" 592 m	**SEAWATER/GEL/DRILLED SOLIDS** • 1.03 – 1.08 sg • API Fl No control • PV 3- 4 cP • 6 rpm 15 – 20 lbs/100ft² • Hole in Good condition • Allowed mud weight to rise with drilled solids. $13^{3}/_{8}$" 626 m
	SEAWATER/DRILLED SOLIDS **13 ¾" hole size** **Mud Properties:** • Unknown **Problems** • Drilled 100% marl to 670 m • No problems. $10^{3}/_{4}$" 670 m	**SEAWATER/GEL/POLYMER** **FIT = 1.68 sg EMW** **Mud Properties:** • Unknown **Problems** • Drilled 100% marl to 920 m • Drilled sands from 920 m with intercalations of marl. • No problems. TD @ 1219 m 6.3 Rig days	**SEAWATER/GEL/POLYMER** **LOT = 1.82 sg EMW** **Mud Properties:** • 1.26 – 1.28 sg • API Fl 10 – 14 cc • Chloride 17,000 ppm • 6 rpm 15 – 20 lbs/100ft² **Problems** • Max pore pressure recorded @ 1.045 SG EMW in interval • BHST @ 951 ~ 50°C. • No problems. TD @ 951 m **8 days including coring**
	GEL/LIGNOSULPHONATE **9 $^{7}/_{8}$" hole size** **Mud Properties:** • Mud weight ~ 1.28 SG • API Fl 3.8 cc **Problems** • Addition of lignosulphonate was necessary to keep weight down • Drilled sands from 810 m with intercalations of chloritic claystone. • No problems. • Caliper log 10 – 12" TD @ 1129 m 13 Rig days		

5. INTERVAL DISCUSSIONS

5.1 36" HOLE SECTION

Interval section	130 m to 153 m
Section Length	23 m
30" Casing set at	152m
Mudline at	130 m

5.1.1 Mud Type:

Sea Water with High Viscosity Pre-hydrated Bentonite (PHG) sweeps

5.1.2 Fluid Properties:

	High Viscosity Sweeps	Open Hole Displacement at TD.
Density	Unweighted	Unweighted
6 rpm	>40	>40
Yield Point	Dependent on 6 rpm	Dependent on 6 rpm
API Fluid Loss	No Control	No Control

5.1.3 Interval Threats / Barriers:

Threat	Barriers
Seabed Erosion	Drill 1st 10m with slow pump rates and with PHG.
Shallow Gas	No shallow gas is predicted.
Hole Stability	Sweep hole and Displace at Section TD with PHG to form Filter Cake.
Downhole Losses	Potential for partial returns or total losses in Carbonates, Cuttings should seal losses. If losses are severe at TD then include LCM in displacement PHG.

5.1.4 Engineering Outline:

This interval will be drilled with seawater and 2 x 100 bbl high viscosity PHG sweeps

At section TD, the hole will be swept clean then displaced with 155 bbls of PHG i.e. 150% of the hole volume, to ensure the wellbore is full, including overgauge sections.

5.2 12¼" HOLE SECTION

Interval section	153 m to 247 m
Section Length	94 m
Casing set at	242 m
Previous casing set at	152 m

5.2.1 Mud Type:

Seawater with High Viscosity Sweeps

Alternate Pre-hydrated Bentonite and Guar Gum sweeps. PHG sweep prior to connection. Use KCl/PHG/Drispac SL slurry for TD displacement.

5.2.2 Fluid Properties:

High Viscosity Sweeps		Open Hole Displacement at TD.
Density	Unweighted	1.10 sg
6 rpm	>40	>25
Yield Point	Dep't on 6 rpm	Dep't on 6 rpm
API Fluid Loss	No Control	<5.0
KCl % by Wt.		6%

5.2.3 Interval Threats / Barriers:

Threat	Barriers
Hole Stability	Sweep hole and Displace at Section TD with weighted KCl/PHG/Drispac SL slurry to mitigate swelling/dispersion of the Lakes entrance Marl and form tight filter cake across permeable formations.
Downhole Losses	Potential for partial returns or total losses in the Gippsland Carbonates, Cuttings should seal losses. If losses are severe at TD then include LCM in displacement in consultation with the WSM.
Hole Cleaning	Adhere to programmed sweep schedule. Adjust sweep volume and / or frequency according to ROP for optimum cleaning.

5.2.4 Engineering Outline:

This interval will be drilled with seawater and high viscosity sweeps pumped at regular intervals.

At section TD, the hole will be swept clean then displaced with PHG at 150% of the hole volume to wellbore is full, including enlarged sections, as specified in the Section 5.2.7.

5.2.5 Interval Key Issues:

1. This interval will be drilled with sea water and alternate high viscosity PHG and Guar Gum sweeps, as per the schedule detailed in Section 5.2.6. Ensure only PHG sweeps are pumped just prior to connections.
2. In order to stabilise any reactive clays exposed at the bottom of the section, in the Lakes Entrance formation, an inhibitive displacement slurry will pumped composed of Bentonite / Drispac / KCl pill.
3. Losses can be expected when drilling in this essentially calcareous interval.

5.2.6 Recommended Sweep Schedule and Volumes:

Rate of Penetration (m/hr)	Sweep Volume	Sweeps per Stand
< 100	30 + 30 + 50 bbls	3
> 100	50 bbls	2
<20	50 bbls	Every 15 minutes

- ***These are guidelines only*** - hole conditions and drilling parameters should determine actual sweep schedule and volumes pumped.

Prior to connections pump a PHG sweep and circulate past BHA before shutting off the pumps.

When drilling with seawater, a high viscosity sweep should be pumped at least every 15 m drilled i.e. every half stand or as hole conditions dictate. Before making a connection, a high viscosity PHG sweep should be pumped and circulated well above the BHA. After the connection a further high viscosity sweep should be pumped.

Increase sweep volumes if ROP's are above normal, pumping larger sweeps at the mid-point of the stand and after connections. The last sweep pumped prior to the connection should be pumped clear of the BHA prior to making the connection. Backream only if hole condition dictates.

Ensure that the pipe is reciprocated as much as possible during down time. If the normal pump rate cannot be maintained owing to pump problems, continue to circulate with available pumps and pump high viscosity sweeps frequently during repair. It is recommended that drilling be stopped if the required pump rate cannot be achieved.

Monitor torque and drag closely. Any increase in these parameters should prompt additional circulating, wiping of the hole and / or increased sweep volume.

If losses are observed by ROV or sub-sea camera, then increasing the volume and frequency of the sweeps should be considered.

5.2.7 TD Displacement Volumes:

• High Viscosity Sweep	200 bbls
• Seawater	Circulate hole clean
• Displacement Fluid	1.5 x hole volume (80 bbls)

5.2.8 Displacement Fluid Formulation:

The fluid formulation following should be pumped as the final hole displacement to combat the reactive marl sequence exposed in the Lakes Entrance formation.

Bentonite / Drispac / KCl Formulation

Drill water	:	as required	
Soda Ash	:	< 400 mg/L Hardness	
Caustic Soda	:	to pH 9.0	
Drispac SL	:	0.75 – 1.0	lb/bbl
Bentonite	:	20.0 - 25.0	lb/bbl (Prehydrated)
KCl	:	22.0	lb/bbl

5.3 8 ½" HOLE SECTION:

Interval section	247 m to 525 m
Section Length	278 m
Previous casing set at	242 m
Bottom hole TD static temperature	30 °C

5.3.1 Mud Type:

KCl/PHPA

5.3.2 Fluid Properties:

Mud Density	sg	1.13 - 1.16
Plastic Viscosity	cP @ 120°F	As Low As Possible
Yield Point	Lbs/100Ft^2 @ 120°F	Subject to 6 rpm Value
6 rpm reading	dial units @ 120°F	8 – 12
API Fluid Loss	cc	< 5.0
PHPA	lb/bbl	>1.0
KCl	lb/bbl	18.0 – 22.0

5.3.3 Interval Threats:

Threat	**Barriers**
Personnel Safety using Chemicals	Ensure that all PPE as specified in MSDS is worn when mixing / handling Mud Chemicals.
Hole Stability	The 5 – 6 % wt KCl coupled with the PHPA will provide the basis of wellbore stability. Appropriate mud weight selection will also assist in this goal. ≥1.13 sg for drilling the interval will be required.
Downhole Losses	Seepage losses are likely in the normally pressured highly permeable Latrobe sands from ~ 265 mRT. The Lake Wellington fault has been prognosed in the vicinity running to the seabed. On tripping, care should be taken not to surge the formation and induce losses.
Stuck Pipe	Tripping in and out quickly in reactive claystones may cause stabiliser / reamer to packoff. Ensure proper drilling practices and conduct wiper trip if required. The Latrobe formation is a clean unconsolidated sand sequence with potential to slump. Ensure the 6 rpm specification is maintained and ensure effective hole cleaning is taking place at all times.
Swabbing Hydrocarbons	A mud weight ≥1.13 sg will minimise the possibility of swabbing hydrocarbons in the normally pressured reservoir. Overbalance at 525 mRT in the normally pressured Latrobe will be ≥ 75 psi allowing some safeguard against swabbing hydrocarbons. Again, care should be taken on tripping out of the hole.

5.3.4 Engineering Outline:

- The mud density will be maintained at 1.13 sg initially. Experience has shown that a KCl/PAC/PHPA mud system will stabilise the reactive claystones of the Eocene without the need for elevated mud densities.
- Lost circulation in the Latrobe sands is common in this area, but have been successfully cured with correctly applied LCM pills, as referred to in section 5.3.7.2.

5.3.5 Interval Key Issues:

Throughout the Bass Strait the Lakes Entrance formation is observed to be argillaceous and reactive to water-based drilling fluids. Although it is prognosed that only +/- 10 m of this formation will be exposed prior to drilling the Latrobe sands it is critical that this remains stable not only whilst drilling, but also during wireline logging operations. The KCl/PHPA/PAC system will provide the optimum medium with which to achieve this goal.

The Latrobe sands will likely be unconsolidated and prone to washing out. Hole hydraulics should inn ensure that turbulent flow regimes are minimised, whilst still ensuring optimum hole cleaning.

Northright-1 has been programmed to use an initial mud weight of 1.13 sg. If overpressure and/or wellbore conditions dictate that the mud weight will be increased, then response time must be rapid. Two of the offset wells reviewed in Section 4 used mud weights ~ 1.28 sg for no apparent reason, so vigilance is critical in this regard.

5.3.6 System Maintenance:

5.3.6.1 Mud Weight:

Mud weight is to be controlled through the maximum optimisation of all available solids control equipment and prudent additions of pre-mix. Where feasible all pre-mixes should be unweighted to assist in mud weight control. The mud weight should be maintained initially at 1.13 sg. Density control through the reservoir section is critical to manage overbalance and hence reduce filtrate invasion and the potential for differential sticking.

Hole condition should be closely monitored very closely to ensure weight up response time is rapid.

5.3.6.2 Inhibition

The inhibition of the system is maintained with additions of PHPA shale inhibitor in combination with the inhibiting KCl salt. Under normal circumstances, the concentrations of these additives will not rapidly deplete. If extra inhibition is required, the additive concentrations can be increased without having a detrimental effect on the fluid properties. The preferred pH range for optimum inhibition is 7.5 - 8.5.

Premix all polymers before adding to the active to ensure full hydration. Using the shear unit can accelerate this, if required. Replace consumable PHPA at the rate of 4 lb/bbl of hole volume (±1.5 lb / m drilled) by either direct addition of Newdrill L (if available) at the suction or by premix with the appropriate concentration of Alcomer 120. No shear mixer is present on the Ocean Bounty, therefore it is important to prepare premixes with Alcomer 120 well in advance and maybe even prior to spud.

Use Drillwater to disperse and hydrate the polymers.

5.3.6.3 Rheology:

All rheological properties should be taken at 120°F and not at flowline temperature or BHT. The control of low shear rate rheology (6 rpm dial reading) should always be related to the pump rate and ROP i.e. cuttings load in the annulus.

The potential to pack off the hole with cuttings exists when drilling at high ROP's. Experience has shown that cuttings concentrations of >5% of the hole volume causes tight hole or stuck pipe when circulation is stopped. A good rule of thumb for 8½" hole is that the ROP (in m/hr) should not exceed 25% of the pump rate (in gpm) e.g. at 500 gpm maximum permissible ROP should be 125 m/hr. This assumes 80% hole cleaning efficiency allowing for cuttings slip velocity at 20%.

Any signs of the hole packing off i.e. increase in torque and / or pump pressure should be acted upon immediately by backing off on ROP and pump rate (temporarily). It is important to continue pumping and rotating to keep the cuttings free and moving, but to reduce annular pressure to ensure that the formation is not broken down by excessive ECD. Once it has been established that the cuttings are moving, then pump rates should be returned to normal. Where high ROP's are experienced it is recommended to work the pipe, prior to making connections, while pumping at maximum allowable rate to clear cuttings from the BHA and the hole.

The Yield Point is primarily dependent on the 6-rpm dial reading, therefore the 6-rpm dial reading is the rheological property that should be closely monitored and controlled between 8 – 12 by additions of Flowzan.

The Plastic Viscosity value should be minimised by optimum usage of the solids control equipment and judicious dilution with pre-mix where applicable to generate new volume and / or reduce mud rheology. It is essential to remove drilled solids rather than dilute them to acceptable levels.

5.3.6.4 Filtrate Invasion Reduction

Add graded Calcium Carbonate while drilling Target Sands (from 265 mRT) to reduce filtrate invasion, seepage losses and improve Formation Evaluation. Prior to entering the primary objective begin adding $CaCO_3$ to the circulating system at 3 sx Circal Y 3 sx, Circal 60/16 and 3 sx Chekloss. Prior to starting adding these products, the Geologist and the mud loggers should be informed. These treatments are primarily to minimise filtrate invasion, improve filter cake and assist in preventing seepage losses. This concentration should be maintained by fresh additions of product to compensate for material removed by SCE.

5.3.6.5 Fluid Loss Control:

An initial API specification of <6.0 mL for this interval, then tightened to <5.0 mL through the reservoir sands.

5.3.7 Hole Problems

5.3.7.1 Stuck Pipe

If the drill string becomes stuck the mechanism of sticking must be identified before remedial actions can be taken. The following scenarios are the most likely and the appropriate response is discussed.

PACK OFF	
Symptoms	• Pipe becomes stuck while picking up prior to a connection, during a connection, when initiating circulation after a connection or when tripping out of the hole. • Unable to move pipe up or down • Unable to rotate • Unable to circulate. No returns when attempting to pump. Pump pressure keeps on increasing while pumping. Mud eventually squeezed away into the formation.
Causes	• Poor hole cleaning due to low flow rates and / or poor mud rheology • Over loading the annulus by drilling with excessively high instantaneous ROP's • Formation instability resulting in large amounts of cavings • Bringing pump rates up too rapidly, after a connection, when the annulus is loaded with cuttings in a gauge hole • Failure to circulate clean and / or stabilise the hole prior to tripping out
Response	• Work pipe down while attempting to regain circulation and rotation • Commence jarring down while attempting to regain circulation and rotation • Jar up and down while attempting to regain circulation and rotation. • Once pipe becomes free, and circulation is regained, the cause of the pack off must be recognised and rectified to prevent reoccurrence

DIFFERENTIAL STICKING	
Symptoms	• Unable to move pipe up or down • Unable to rotate • Able to circulate with full returns
Causes	• Pipe stuck against the side of the hole, across a semi permeable filter cake, due to a large differential between formation pressure, in a permeable rock, and the hydrostatic pressure of the mud column • Excessive mud weights • Poor mud filtration properties resulting in poor filter cake development across permeable zones • Pipe allowed to remain motionless for long periods of time
Response	Immediately commence jarring while attempting to rotate • Spot 8 m^3 (50 bbls) KCl / Citric acid pill across the stuck zone as rapidly as possible (the key to success is in minimising the time between becoming stuck and the pill being spotted) and allow to soak while working the pipe. The KCl / Citric Acid is spotted to destroy the filter cake in which the pipe is, effectively, partially embedded. Stuck Pipe Pill Formulation:- 1. 8 m^3 (50 bbls) 1.1 sg KCl Brine 2. 114 Kg/m^3 (40 ppb)Citric Acid 3. 2.85 Kg/m^3 (1 ppb) SAPP • The stuck pipe pill will require 3 m^3 (18 bbls) of spacer to be pumped ahead, and 3 m^3 (18 bbls) behind, to maintain its integrity. 8 m^3 of spacer will be formulated in the slug pit as follows - Transfer 4 m^3 of active mud to the slug pit - Add 75 kg's of Chekloss - Add 25 kg's of Drispac SL - Transfer a further 4 m^3 of active mud to the slug pit • If the pipe remains stuck consider circulating and reducing mud weight towards balance point until the pipe becomes free. This may not be a viable option in some cases. • Once the pipe is free the cause of the differential sticking must be recognised and rectified to prevent reoccurrence

TIGHT HOLE	
Symptoms	• Hole sticky on connections with increasing drag • Drag increasing while pulling out of the hole • Eventually the pipe becomes stuck • Unable to move up or down • Unable to rotate • Unable to circulate
Causes	• Formation is squeezing in, due to insufficient hydrostatic pressure, resulting in under gauge conditions • Formation is swelling, due to a reaction with the mud, resulting in under gauge conditions • Both the above normally associated with impermeable claystones
Response	• Work and jar the pipe down while attempting to regain circulation and rotation • Go back to bottom and condition the mud, until drag disappears, by increasing the mud weight and / or correcting any chemical imbalances.

5.3.7.2 Lost Circulation Contingency

There is potential for losses in the highly permeable Latrobe Formation. When drilling-in to such sandstones the potential for lost circulation ranges from seepage to severe.

It is essential to build and store the LCM pill as soon as possible after drilling out the 9 $^{5}/_{8}$" casing shoe @ 255 mRT to cover any lost circulation eventualities.

Table 1 – LCM pill

Volume Built (bbls)	**100**
PRODUCT	**Concentration (lb/bbl)**
Circal 60/16	**15**
Circal Y	**20**
Kwikseal F	**10**
Kwikseal M	**15**
Chekloss	**10**

Note: *Glutaraldehyde should be added to this pill to prevent bacterial degradation of the cellulosic components.*

LCM pills should be quickly spotted when losses are first observed. The volume of the pills pumped should reflect the severity of the losses anticipated / encountered. The following guidelines will assist;

- If **seepage** losses are encountered **(< 50 bbl/hr)** then add 3 sxs of Circal Y, 3 sxs of Circal 60/16 and 3 sxs of Chekloss on a per stand basis. Reduce pump rate also to 450 Gpm.
- If **severe** losses are encountered **(50 - 200 bbl/hr)** then spot **50 bbl** of the pre-concentrated LCM across thief zone at reduced pump rate.
- If **massive** losses are encountered **(>200 bbl/hr)** then spot the **entire 100 bbl** of the pre-concentrated LCM across thief zone at reduced pump rate.

If losses are recorded pick up just above the loss zone and spot an appropriate LCM pill. Do not spot too large a volume as excess LCM pill must later be processed by the shakers. The LCM is likely to cause blinding of the shaker screens resulting in surface losses. Attempts should be made to change out shale shaker screens to 105 mesh prior to pumping the pills.

After spotting LCM pill, pull the bit above the top of the pill. Wait 30 minutes and monitor annulus. **Keep annulus full at all times.**

Notes:

Drilling ahead should not proceed until losses have been cured and enough LCM pill volume is available for another pill.

All LCM pills must be thoroughly mixed and homogenised before being pumped.

Remove filter screens from the drill pipe and, if necessary, from the mud pump suction lines.

5.3.7.3 Tight Hole

Tight hole on trips or connections is often associated with WBM.

The general scenario is one of the hole being tight over sections that are being tripped through for the first time. The well bore tends to swell slightly behind the bit as the complex chemical exchanges involved in stabilisation are taking place. Typically once a section of hole has been backreamed / tripped through, and the hole, in effect, restored to full gauge, this tendency is greatly reduced or non-existent.

Where tight hole continues to be a problem the solution is an increase in mud density.

5.3.7.4 Overpressure

It should be remembered however that nothing is completely predictable in exploration drilling and constant vigilance must be maintained in order to identify the signs of decreasing hydrostatic overbalance such as increasing connection gas.

Good drilling practices are essential if the mud density is to be increased **before** a critical situation develops.

Vigilance is required to ensure the minimum stock requirement for Barite is maintained on the rig at all times.

Maintaining optimum properties at all times will ensure the mud will always be in condition to take additional Barite, if required.

5.3.8 Wireline Logging Operations

5.3.8.1 Mud Preparation Prior to Logging

If the mud is maintained at the programmed properties then no specific adjustments will be required prior to logging.

Under no circumstances will the rheology be reduced, for logging purposes, prior to reaching TD.

Mud weight shall be ≤1.16 sg prior to commencing logging operations, unless hole conditions dictate otherwise.

5.3.8.2 Extended Logging Programs

The mud will not require additional treatments to prepare it for a long logging program.

5.3.8.3 Undergauge Hole

Filter cake build up on the sands tends to result in the hole being ¼" to ½" undergauge.

These conditions should present no problems during logging operations.

5.3.8.4 Wiper Trips

There is a greater possibility of requiring a wiper trip during extended logging programs in a WBM.

However a wiper trip should only be made if hole conditions deteriorate during logging operations.

By ensuring the mud is in peak condition prior to logging it will be possible to complete the program without a wiper trip.

6. ESTIMATED WELL MATERIAL CONSUMPTION

Product	Unit	US $ Price	Quantity	Total
Alcomer 120	25 Kg	$105.59	33	$3,484.47
Newdrill L	18.9 Ltr	$48.77	8	$390.16
Caustic Potash	25 Kg	$36.81	9	$331.29
Caustic Soda	25 Kg	$26.01	8	$208.08
Drispac Regular	22.68 Kg	$122.01	9	$1,098.09
Drispac SL	22.68 Kg	$122.01	11	$1,342.11
Flowzan	25 Kg	$308.58	13	$4,011.54
Mil-Bar (bulk)	1000 Kg	$161.78	18	$2,912.04
Glutaraldehyde	18.9 Ltr	$74.36	2	$148.72
Mil-Gel (bulk)	1000 Kg	$258.26	32	$8,264.32
Mil-Guar	25 Kg	$70.47	30	$2,114.10
Pot Chloride (Bulk)	1000 Kg	$353.82	10	$3,538.20
Soda Ash	25 Kg	$13.17	14	$184.38
Sodium Bicarbonate	25 Kg	$13.81	9	$124.29
	Dumping Estimated Total			**$30,283.27**

Well Performance Indicators			
Cost per M^3	61.69	Cost per Bbl	9.81
Cost per Meter	75.71	Cost per Foot	23.08
M^3 per Meter	1.23	Bbl per Foot	2.35

7. INTERVAL MATERIAL CONSUMPTION BREAKDOWN

The material consumption for hole section is based on achieving the well objectives within budget and does not take into account unscheduled events, such as lost circulation.

7.1 36" INTERVAL

Mudline:	125 Meters	410 Feet	
Hole Section Depth	150 Meters	492 Feet	
Hole Section Length	25 Meters	82 Feet	
Open Hole Volume	16 M^3	103 Bbls	
Surface Volume	48 M^3	300 Bbls	
Number of sweeps	2	2	
Sweep Volume	16 M^3	100 Bbls	
TD Sweep Pills	32 M^3	200 Bbls	
Total Sweep Volume	64 M^3	400 Bbls	
Excess	50 %	50 %	
Displacement Volume	25 M^3	155 Bbls	1.5 x hole vol
Total Volume	152 M^3	958 Bbls	

Product	Unit	US $Price	Conc.	Quantity	Total
Caustic Soda	25 Kg	$26.01	0.20	4	$104.04
Mil-Bar (bulk)	1000 Kg	$161.78	5.00	1	$161.78
Mil-Gel (bulk)	1000 Kg	$258.26	35.00	16	$4,132.16
Soda Ash	25 Kg	$13.17	0.10	2	$26.34
			Estimated Total		**$4,424.32**

Interval Performance Indicators			
Cost per M^3	$29.04	Cost per Bbl	$4.62
Cost per Meter	$176.97	Cost per Foot	$53.94
M^3 per Meter	6.09	Bbl per Foot	11.68

7.2 12 ¼" INTERVAL

Previous Casing Depth	149 Meters	489 Feet	
Hole Section Depth	260 Meters	853 Feet	
Hole Section Length	111 Meters	364 Feet	
Open Hole Volume	8 M^3	53 Bbls	
Surface Volume	48 M^3	300 Bbls	
Number of sweeps	8	8	
Sweep Volume	8 M^3	50 Bbls	
TD Sweep Volume	32 M^3	200 Bbls	Guar Gum
Total Sweep Volume	95 M^3	600 Bbls	400
Excess	50 %	50 %	Pre-Hyd Gel
Displacement Volume	13 M^3	79 Bbls	839
Casing Volume	10 M^3	60 Bbls	
Total Volume	197 M^3	1,239 Bbls	

Product	Unit	US $Price	Conc.	Quantity	Total
Caustic Soda	25 Kg	$26.01	0.20	4	$104.04
Drispac SL	22.68 Kg	$122.01	1.00	2	$244.02
Glutaraldehyde	18.9 Ltr	$74.36	0.15	2	$148.72
Mil-Gel (bulk)	1000 Kg	$258.26	35.00	14	$3,615.64
Mil-Guar	25 Kg	$70.47	4.00	30	$2,114.10
Pot Chloride (Bulk)	1000 Kg	$353.82	30.00	2	$707.64
Soda Ash	25 Kg	$13.17	0.10	3	$39.51
		(Dumping)	**Estimated Total**		**$6,973.67**

Interval Performance Indicators			
Cost per M^3	$731.41	Cost per Bbl	$116.28
Cost per Meter	$62.83	Cost per Foot	$19.15
M^3 per Meter	0.09	Bbl per Foot	0.16

7.3 8½" INTERVAL

Previous Casing Depth	255 Meters	837 Feet
Hole Section Depth	525 Meters	1723 Feet
Hole Section Length	270 Meters	886 Feet
Surface Volume	48 M^3	300 Bbls
Riser Volume	23 M^3	144 Bbls
Casing Volume	5 M^3	31 Bbls
Hole Volume	10 M^3	61 Bbls
Dilution Rate	0.21 M^3 / M	0.40 Bbls / Ft
Dilution Volume	56 M^3	354 Bbls
Brought Forward	M^3	Bbls
Total Made	142 M^3	890 Bbls
Total Volume	142 M^3	890 Bbls
TD Volume	85 M^3	536 Bbls
Pot Recovered Vol	76 M^3	475 Bbls

Product	Unit	US $Price	Conc.	Quantity	Total
Alcomer 120	25 Kg	$105.59	2.00	33	$3,484.47
Newdrill L	18.9 Ltr	$48.77	0.35	8	$390.16
Caustic Potash	25 Kg	$36.81	0.50	9	$331.29
Chekloss	11.34 Kg	$42.27	Per stand	26	$1,099.02
Circal 60/16	25 Kg	$18.62	Per stand	26	$484.12
Circal Y	25 Kg	$21.09	Per stand	26	$548.34
Drispac Regular	22.68 Kg	$122.01	0.50	9	$1,098.09
Drispac SL	22.68 Kg	$122.01	1.00	9	$1,098.09
Flowzan	25 Kg	$308.58	0.75	13	$4,011.54
Mil-Bar (bulk)	1000 Kg	$161.78	42.00	17	$2,750.26
Mil-Gel (bulk)	1000 Kg	$258.26	3.00	2	$516.52
Pot Chloride (Bulk)	1000 Kg	$353.82	18.00	8	$2,830.56
Soda Ash	25 Kg	$13.17	0.50	9	$118.53
Sodium Bicarbonate	25 Kg	$13.81	0.50	9	$124.29
		(Dumping)	**Estimated Total**		**$18,885.28**

Interval Performance Indicators			
Cost per M^3	$133.41	Cost per Bbl	$21.21
Cost per Meter	$69.95	Cost per Foot	$21.32
M^3 per Meter	0.52	Bbl per Foot	1.01

5.3 Cementing Program

HALLIBURTON CEMENT PROGRAM

HALLIBURTON AUSTRALIA PTY LTD
CUSTOMER : Eagle Bay
WELL NAME:Northright-1

DATE : 26 March,2001
REF:Rev 1.2

CONDITION:-CONDUCTOR CASING

API TEST SCHEDULE:-CASING
TEMP GRAD: 1.6° F/100 FT
BHST: 80 °F / 27 °C
BHCT: 80°F / 27 °C

30 IN. (762 mm) X 13.375 IN.(339.7mm) CASING SET @ 499 FT (152m)
36 IN. (914.4mm) HOLE FROM 427 FT. (130m) TO 499 FT (152m)
FILL-UP REUIRED TO 427 FT (130m) USING
200 % EXCESS IN OPEN HOLE SECTION.

SPACER & FLUSH

80 BBL WATER PREFLUSH

CEMENT SLURRY

(II) TAIL SLURRY: 168.8 BBL EXPECTED MIXING TIME 33.8 MIN

CEMENT INTERVAL : 130m - 152m

Slurry properties are indicative values based database information, subject to confirmation by laboratory testing

CEMENT COMPOSITION: MATERIAL REQUIREMENT:

		CLASS G CEMENT		817 SK
1	%bwoc	CACL2	ACCELERATOR	768 lb
0.25	gal/10 bbl mix water *	D-AIR 3000L	DEFOAMER	2.5 gal
5.15	gal/sk	SEA WATER	WATER	100.2 bbl
	*per 10 bbl mix water			

SLURRY PROPERTIES:

****CALCULATED JOB TIME + 90 min : 2.33 HRS*

SLURRY WEIGHT	15.90 LB/GAL	1.91 SG
SLURRY VOLUME	1.16 CUFT/SK	32.847 Litre/sk
MIX WATER REQUIREMENT	5.15 GAL/SK	19.495 Litre/sk

THICKENING TIME : 02:00 HR:MIN
COMPRESSIVE STRENGTH @ : 80° F
24 HOURS : 4000 PSI
FLUID LOSS : N/A CC/30MIN FW : <1 % @ 0°

HALLIBURTON

CEMENT PROGRAM

HALLIBURTON AUSTRALIA PTY LTD
CUSTOMER : Eagle Bay
WELL NAME:Northright-1

DATE : 26 March,2001
REF:Rev 1.2

CALCULATION

ANNULAR VOLUME BETWEEN CASING AND HOLE	=2.15984 X (458.69-426.51)+6.0928 X (498.69-458.69) =313.21
200% EXCESS IN OPEN HOLE	=2 X 313.21 =626.43
10 FT SHOE JOINT	=10 X 0.84066 =8.4 CUFT
TOTAL SLURRY VOLUME REQUIRED	=313.21+626.43+0+8.4 =947.8 CUFT (168.8 BBL)
VOL OF TAIL-IN SLURRY FOR 72 FT OF ANNULAR FILL	=(2.15984 X 32.178 X 3) + (6.0928 X 40 X 3) + 8.4 =947.8 CUFT
VOL OF DISPLACEMENT	=8.7 BBL =1.4 m3
TIME TO DISPLACE @10 BPM	=0.9 MIN

HALLIBURTON

CEMENT PROGRAM

HALLIBURTON AUSTRALIA PTY LTD
CUSTOMER : Eagle Bay
WELL NAME: Northright-1

DATE : 26 March,2001
REF:Rev 1.2

CONDITION:-INTERMEDIATE CASING

API TEST SCHEDULE:-CASING
TEMP GRAD: 1.6° F/100 FT
BHST: 80 °F / 27 °C
BHCT: 80°F / 27 °C

9.625 IN.(244.5mm) CASING SET @ 794 FT (242m)
12.25 IN. (311.2mm) HOLE FROM 499 FT. (152m) TO 794 FT (242m)
FILL-UP REQUIRED TO 427 FT (130m) USING
100 % EXCESS IN OPEN HOLE SECTION.

SPACER & FLUSH

80 BBL WATER PREFLUSH

CEMENT SLURRY

(II) TAIL SLURRY:

62.7 BBL EXPECTED MIXING TIME 12.5 MIN

CEMENT INTERVAL : 130m - 242m

Slurry properties are indicative values based database information, subject to confirmation by laboratory testing

CEMENT COMPOSITION:				MATERIAL REQUIREMENT:
		CLASS G CEMENT		304 SK
0.25	gal/10 bbl mix water *	D-AIR 3000L	DEFOAMER	0.9 gal
5.15	gal/sk	SEA WATER	WATER	37.3 bbl
	*per 10 bbl mix water			

SLURRY PROPERTIES:

***CALCULATED JOB TIME + 90 min : 2.01 HRS

SLURRY WEIGHT	15.90 LB/GAL	1.91 SG
SLURRY VOLUME	1.16 CUFT/SK	32.847 Litre/sk
MIX WATER REQUIREMENT	5.15 GAL/SK	19.495 Litre/sk

THICKENING TIME : 02:45 HR:MIN
COMPRESSIVE STRENGTH @ : 80° F
24 HOURS : 4000 PSI
FLUID LOSS : N/A CC/30MIN FW : <1 % @ 0°

HALLIBURTON

CEMENT PROGRAM

HALLIBURTON AUSTRALIA PTY LTD
CUSTOMER : Eagle Bay
WELL NAME:Northright-1

DATE : 26 March,2001
REF:Rev 1.2

CALCULATION

ANNULAR VOLUME BETWEEN CASING AND HOLE	=0.31319 X (794-499) =92.4 CUFT
100% EXCESS IN OPEN HOLE	=1 X 92.4 =92.4 CUFT
ANN VOL BETWEEN CSG & CSG	=0.3353 X (498.69-458.69)+3.7708 X (458.69-426.51) =134.75 CUFT
80 FT SHOE JOINT	=80 X 0.41102 =32.9 CUFT
TOTAL SLURRY VOLUME REQUIRED	=92.4+92.4+134.75+32.9 =352.3 CUFT (62.7 BBL) =10 M3
VOL OF TAIL-IN SLURRY FOR 367 FT OF ANNULAR FILL	=(295.27 X 0.31319 X 2)+(40 X 0.3353) + (32.17 X 3.7708)+32.9 =352.3 CUFT (62.7 bbl) =10 M3
VOL OF DISPLACEMENT	=28.6 BBL =4.5 M3
TIME TO DISPLACE @10 BPM	=2.9 MIN

CEMENT PROGRAM

HALLIBURTON

HALLIBURTON AUSTRALIA PTY TD
CUSTOMER : Eagle Bay
WELL NAME:Northright-1

DATE : 26 March,2001
REF:Rev 1.2

CONDITION :- P&A PLUG 1

API TEST SCHEDULE :- PLUG
TEMP GRAD: 1.6° F/100 FT
BHST: 81 °F / 27 °C
BHCT: 80°F / 27 °C

PLUG INTERVAL : 1148.4 FT (350m) TO 689 FT (210m)
9.625 IN (244.5 mm) CASING SET FROM SURFACE TO 794 FT (242 m)
8.5 IN (215.9 mm) HOLE FROM 794 FT (242 m) TO 1722.5 FT (525 m)
PLUG HEIGHT OF 459.4 FT (140 m) CALCULATED BASED ON
50% EXCESS IN OPEN HOLE SECTION

SPACER & FLUSH

80 BBL WATER PREFLUSH

CEMENT SLURRY

(II) TAIL SLURRY: 45 BBL EXPECTED MIXING TIME 9 MIN

CEMENT COMPOSITION:

Slurry properties are indicative values based database information, subject to confirmation by laboratory testing

MATERIAL REQUIREMENT:

		CLASS G CEMENT		218 sk
0.25	gal/10 bbl mix water *	D-AIR 3000L	DEFOAMER	0.7 gal
5.15	gal/sk	SEA WATER	WATER	26.7 bbl

*per 10 bbl mix water

SLURRY PROPERTIES:

****CALCULATED JOB TIME + 60 min : 3.04 HRS*

SLURRY WEIGHT	15.90 LB/GAL	1.91 SG	THICKENING TIME : 02:45 HR:MIN
SLURRY VOLUME	1.16 CUFT/SK	32.847 Litre/sk	COMPRESSIVE STRENGTH @ : 81° F
MIX WATER REQUIREMENT	5.15 GAL/SK	19.495 Litre/sk	24 HOURS : 4000 PSI

FLUID LOSS : N/A CC/30MIN FW : <1 % @ 0°

HALLIBURTON — **CEMENT PROGRAM**

HALLIBURTON AUSTRALIA PTY TD
CUSTOMER : Eagle Bay
WELL NAME:Northright-1

DATE : 26 March,2001
REF:Rev 1.2

CALCULATION

CASING VOLUME	= 0.41102 X (794 - 689) = 43.2 CUFT
OPEN HOLE VOLUME	= 0.39406 X (1148.4 - 794) = 139.7 (CUFT)
50% EXCESS ONOPEN HOLE VOLUME	= 0.5 X 139.7 =69.9 CUFT
TOTAL SLURRY VOLUME REQUIRED	= 139.7+69.9+43.2 =252.8 CUFT (45 BBL) =7.2 M3
VOL OF DISPLACEMENT	= 12.2 BBLS = 1.9 m3
TIME TO DISPLACE @ 10 BPM	= 1.2 min

CEMENT PROGRAM

HALLIBURTON AUSTRALIA PTY TD
CUSTOMER : Eagle Bay
WELL NAME:Northright-1

DATE : 26 March,2001
REF:Rev 1.2

CONDITION :- P&A PLUG 2

API TEST SCHEDULE :- PLUG
TEMP GRAD: 1.6° F/100 FT
BHST: 80 °F / 27 °C
BHCT: 80°F / 27 °C

PLUG INTERVAL : 689 FT (210m) TO 541.4 FT (165m)
9.625 IN (244.5 mm) CASING SET FROM SURFACE TO 794 FT (242 m)
PLUG HEIGHT OF 147.6 FT (45 m) CALCULATED BASED ON
INTERNAL DIAMETER OF 9.625 IN CASING

SPACER & FLUSH

80 BBL WATER PREFLUSH

CEMENT SLURRY

(II) TAIL SLURRY: 10.8 BBL EXPECTED MIXING TIME 2.16 MIN

CEMENT COMPOSITION:

Slurry properties are indicative values based database information, subject to confirmation by laboratory testing

MATERIAL REQUIREMENT:

		CLASS G CEMENT		52 sk
0.25	gal/10 bbl mix water *	D-AIR 3000L	DEFOAMER	0.2 gal
5.15	gal/sk	SEA WATER	WATER	6.4 bbl

*per 10 bbl mix water

SLURRY PROPERTIES:

****CALCULATED JOB TIME + 60 min : 2.38 HRS*

SLURRY WEIGHT	15.90 LB/GAL	1.91 SG	THICKENING TIME : 02:45 HR:MIN
SLURRY VOLUME	1.16 CUFT/SK	32.847 Litre/sk	COMPRESSIVE STRENGTH @ : 80° F
MIX WATER REQUIREMENT	5.15 GAL/SK	19.495 Litre/sk	24 HOURS : 4000 PSI

FLUID LOSS : N/A CC/30MIN FW : <1 % @ 0°

HALLIBURTON CEMENT PROGRAM

HALLIBURTON AUSTRALIA PTY TD
CUSTOMER : Eagle Bay
WELL NAME:Northright-1

DATE : 26 March,2001
REF:Rev 1.2

CALCULATION

CASING VOLUME	= 0.41102 X (689 - 541.4) = 60.7 CUFT
TOTAL SLURRY VOLUME REQUIRED	= 0+0+60.7 =60.7 CUFT (10.8 BBL) =1.7 M3
VOL OF DISPLACEMENT	= 9.6 BBLS = 1.5 m3
TIME TO DISPLACE @ 10 BPM	= 1 min

CEMENT PROGRAM

HALLIBURTON AUSTRALIA PTY LTD
CUSTOMER : Eagle Bay
WELL NAME:Northright-1

DATE : 26 March,2001
REF:Rev 1.2

MATERIAL SUMMARY

CEMENT & CEMENT ADDITIVES

		13.375 CASING	9.625 CASING	5 LINER	P&A PLUG 1	P&A PLUG 2	TOTAL
CLASS G	SK	817	304	0	218	52	1391
CACL2	lb	768	0	0	0	0	768
D-AIR 3000L	gal	3	1	0	1	0	4

SPACER & FLUSH MATERIAL

NOTE :

1) THE ABOVE MATERIAL SUMMARY DOES NOT INCLUDE THE REQUIREMENT FOR SQUEEZE BACK JOBS.

2) THE QUANTITIES SHOWN ABOVE ARE THE EXACT AMOUNT REQUIRED FOR THE JOBS, NO ALLOWANCES HAS BEEN MADE FOR ANY HANDLING LOSSES OR DEAD TANK VOLUMES.

3) ADDITIVES CONCENTRATIONS, THICKENING TIMES AND COMPRESSIVE STRENGTHS ARE ESTIMATES AT THIS TIME AND WILL BE CONFIRMED WITH LABORATORY TESTING.

908999 056

Casing Cementing Program

HOLE	CASING		CEMENT SLURRY								NOTES
SIZE (in)	SIZE (in)	SETTING DEPTH (m RT)	TYPE	REQUIREMENTS		WATER (gal/sk)	WEIGHT (sg)	VOL (bbls)	EXCESS	TOC (m RT)	
36	13.375	152 m MD 152 m TVD	TAIL	Free Water: Fluid Loss: Thickening Time: Compressive Strength:	<1 % @ 0° N/A cc/30 min 02:00 hr:min 4000 psi	5.15	1.91	168.8		130	
12.25	9.625	242 m MD 242 m TVD	TAIL	Free Water: Fluid Loss: Thickening Time: Compressive Strength:	<1 % @ 0° N/A cc/30 min 02:45 hr:min 4000 psi	5.15	1.91	62.7	100 % excess on gauge hole	130	

Notes :
(1) Volume includes excess as stated
(2) Displacement rates used for calculations is 10 bbls/min
(3) Mix and pump rates used for calculations is 5 bbls/min
(4) Displacement volumes should be confirmed with halliburton prior to the job

908999 057

Plug Cementing Program

HOLE	PLUG		CEMENT SLURRY							NOTES
SIZE (in)	No.	SETTING DEPTH (m RT)	TYPE	REQUIREMENTS	WATER (gal/sk)	WEIGHT (sg)	VOL (bbls)	EXCESS	TOP OF PLUG (m RT)	
8.5	1	350	TAIL	Free Water: <1 % @ 0° Fluid Loss: N/A cc/30 min Thickening Time: 02:45 hr:min Compressive Strength: 4000 psi	5.15	1.91	45	50 % excess on gauge hole	210	
8.5	2	210	TAIL	Free Water: <1 % @ 0° Fluid Loss: N/A cc/30 min Thickening Time: 02:45 hr:min Compressive Strength: 4000 psi	5.15	1.91	10.8	50 % excess on gauge hole	165	

Notes:
(1) Volume includes excess as stated
(2) Displacement rates used for calculations is 10 bbls/min
(3) Mix and pump rates used for calculations is 5 bbls/min
(4) Displacement volumes should be confirmed with Halliburton prior to the job

908999 053

5.4 Casing Design

Design Criteria			
Casing	**Burst Design**	**Collapse Design**	**Tension Design**
Conductor 30"x13 3/8"	Not applicable	Not applicable	Not applicable
Surface 20" W/H extn x 9 5/8"	**Internal Pressure** use lesser of:- • Max. pore pressure from TD less head of gas. **or** • LOT pressure at shoe.	**Internal Pressure** • Casing is 50% evacuated. **External Pressure** • HSP due to SW + mud while running.	Use the buoyed casing weight + greater of: • 200 kips, **or** • test pressure load of 2,000psi.

Hole Parameters					
Hole Size (")	**Hole Depth (mRT)**	**Casing set @ (mRT)**	**Pore Pressure (sg)**	**Mud Weight (sg)**	**FIT EMW (sg)**
36"	153	152	1.04	1.08	N/A
12 ¼"	247	242	1.04	1.08	1.5
8 ½"	525	-	1.08	1.1	-

Casing Specs				Casing Performance			Safety Factors		
Casing Size (")	**Weight (ppf)**	**Grade**	**Connection Type**	**Burst (psi)**	**Collapse (psi)**	**Tension (kips)**	**Burst**	**Collapse**	**Tension**
30" x 13 3/8"	310	X-52	SF60	N/A	N/A	4,743	N/A	N/A	3.3
	68	L-80	New Vam	5,017	2,262	1,557	28.7	23.4	3.4
20" ext x 9 5/8"	133	X-52	Welded	5,658	4,400	3,000	37.2	87.2	2.9
	47	L-80	New Vam	4,756	6,859	1,086	24.0	34.0	4.0

5.5 Hydraulics Calculation (8 1/2" Hole)

Security DBS
A Halliburton Company

HYDRAULIC CALCULATION

COMPANY	LOCATION	WELL NO.	RIG	BIT TYPE	PREPARED BY	DATE
Eagle Bay Resources	Bass Strait	Northright 1	Ocean Bounty	8.5 Varel L 127	Steve Hodgetts	22/Mar/01

RESULTS DEPTH IN	
Total Flow (gpm)	490
Surface Pressure (psi)	976
Bit Pressure (psi)	568
Bit HSI (hp/in²)	2.86
RESULTS DEPTH OUT	
Total Flow (gpm)	490
Surface Pressure (psi)	1086
Bit Pressure (psi)	584
Bit HSI (hp/in²)	2.95

INPUT PARAMETERS			
Depth In (m)	247	Depth Out (m)	525
Hole Dia (in)	8.500	Hole Dia (in)	8.500
Total Flow (gpm)	490	Total Flow (gpm)	490
Bit TFA (in²)	0.589	Bit TFA (in²)	0.589
Mud Type	KCl/PHPA	Mud Type	KCl/PHPA
Mud Wt (ppg)	8.92	Mud Wt (ppg)	9.17
PV (cp)	21	PV (cp)	21
YP (lb/100ft²)	24	YP (lb/100ft²)	24

NOZZLES	
Qty	Size (1/32")
3	16
0	0
0	0
0	0
TFA	0.589

STRING LOSSES

			DEPTH IN		DEPTH OUT	
Item	O.D. (in)	I.D. (in)	Length (m)	Pressure (psi)	Length (m)	Pressure (psi)
Surface #3	n/a	3.500	26.52	13	26.52	13
Drillpipe	5.000	4.276	60.55	11	338.55	65
12 x HWDP	5.000	3.000	108.00	111	108.00	114
6 X 8" DC/Acc./Jar	6.500	2.813	63.00	89	63.00	91
8" MWD	6.500	n/a	15.10	152	15.10	156
PDM	6.500	6.135	0.00	0	0.00	0
8.5" Bit	12.250	n/a	0.35	568	0.35	584
Calculated String Losses (psi)				945		1023

ANNULAR LOSSES

			DEPTH IN		DEPTH OUT	
Item	Hole Dia (in)	Pipe Dia (in)	Length (m)	Pressure (psi)	Length (m)	Pressure (psi)
Drillpipe 1	8.500	5.000	60.55	2	338.55	33
HWDP	8.500	5.000	108.00	11	108.00	11
Collars/MWD/Jars	8.500	6.500	78.10	19	78.10	19
PDM	8.500	6.500	0.00	0	0.00	0
Calculated Annular Losses (psi)				31		63

TYPE OF FLOW

	DEPTH IN			DEPTH OUT		
Item	Ann Vel	Critical Vel.	Flow	Ann Vel	Critical Vel.	Flow
Drillpipe 1	254	360	LAMINAR	254	354	LAMINAR
HWDP	254	360	LAMINAR	254	354	LAMINAR
Collars/MWD/Jars	400	412	LAMINAR	400	405	LAMINAR
PDM	400	412	LAMINAR	400	405	LAMINAR

TOTAL PRESSURE DROP, PSI IN : 976 OUT : 1086

5.6 Contact List

Co Service / Position	Name	Phone	Mobile	Fax	e-mail (A/H #)
EBR - Perth Office					
Managing Director	Tony Rechner	9481 3322	0419 042 250	9481 3330	ebr@indigo.net.au
Exploration Manager	Milton Schmedje	9481 3322	-	9481 3330	ebr@indigo.net.au (9381 3063)
EBR - LPM Perth Office					
Drilling Superintendent	Steve Crocker	9423 5611	-	9386 6580	scrocker@lpm.com.au (9386 6539)
Senior Drilling Engineer	Steve Hodgetts	9423 5612	0411 125 248	9386 6580	shodgetts@lpm.com.au (9247 1744)
Ops Geologist	David Thorpe	9423 5604	0417 984 023	9386 6580	dthorpe@lpm.com.au (9381 9529)
Project Advisor	Tom Brand	9423 5603	0413 532 547	9386 6580	tbrand@lpm.com.au
EBR - Eden Supply Base		**Eden (02)**			
Logistcs	John Smith	-	0411 436 610	-	jsmith@lpm.com.au
Diamond Offshore General					
Rig Manager	Tom O'Neill	9481 8333	0411 600 431	9481 8103	toneill@dogc.com.au (9383 9909)
	J Owens	9481 8333	0411 600 443	9481 8103	jowens@dogc.com.au (9332 5257)
Ocean Bounty		**Bendigo (03)**			
Supervisor		TBA			
Radio Room		TBA			
Immarsat B Radio Room		TBA			
VicNRE		**Melbourne (03)**			
	Bruce Armour	9412 9065	0417 398 821	9412 5152	bruce.armour@nre.vic.gov.au
Anadrill					
Directional / FEWD	Bob Kirov	9420 4842	0411 204 971	9322 3080	kirov@perth.anadrill.slb.com
Baker Oil Tools		**Sale (03)**			
Fishing	Perte Wilson	5144 3966	0419 895 863	5144 2426	peter.wilson@bakeroiltools.com
BHI					
Mud Motors	Gavin Baynes	9478 0513	0418 921 270	9478 6155	gavin.baynes@inteq.com
Mud Logging	Grant Meakins	9478 0514	0417 984 422	9478 6155	grant.meakins@inteq.com
Drilling Fluid	Patrick Tomkins	9348 5799	0418 911 178	-	patrick.tomkins@woodside.com.au
CHC		**Adelaide (08)**			
Helicopters	Graham Bowles	8372 7702	0418 808 883	8373 3366	gbowles@chcaustralia.com
Deltanet					
IT Support	Greg Hortell	0500 50 50 59	0418 940 353	9322 8500	greg@deltanet.com.au
DrilQuip					
Wellhead	Brian Maitland	9322 8600	0418 940 353	9322 8500	Brian_Maitland@Dril-Quip.com (9497 5450)
Fugro					
Rig Positioning	John Stoker	9322 4955	0419 862 962	9322 1775	j.stoker@fugro.com.au (9314 1685)
Halliburton					
Cementing	Bruce Roebuck	9278 4100	0411 419 032	9278 4400	bruce.roebuck@halliburton.com
	John Hargraves	-	0414 710 881	-	
Hydrographic Surveys		**Sydney (02)**			
Rig Positioning QC	Greg Halls	9546 7536			
IDS		**Malaysia (603)**	**(601)**	**(603)**	
DDR system	John Hanson	2166 2066	93 869 730	2166 3066	ids@indrill.com
Int'l Geology Services					
Consulting Geologists	Bob Fisher	9339 4623	0414 711 426	9319 1994	rfisher@iinet.net.au
Marconi Communications					
Fastline	John Norman	9324 1599	0411 070 041	9324 1598	john.norman@marconi.com
Oilfield & General Transport					
Ops Manager	Glen Mcleod	9353 3811	0418 929 903	9353 3812	glenn@bramwa.com.au
Material Logostics	Jeff Hart	9353 3811	0419 930 788	9353 3812	jeff.hartn@woodside.com.au
Schlumberger		**Sale (03)**			
Wireline Logging	Trevor Speldrich	5143 2242	0417 865 397	5143 2450	trevor@sale.oilfield.slb.com
	Patrick Foale	9420 4879	0412 050 570	9322 3080	foale@perth.oilfield.slb.com
Smith					
Jars	Wayne Watkins	9455 5311	0417 912 643	9455 5322	wwatkins@smith.com
Wellhead Severence	Greg Watkins	9455 5311	0407 987 437	9455 5322	gwatkins@smith.com
Stolt					
ROV	Graham Husband	9446 0742	0403 462 424	9446 4822	graham.husband@stoltoffshore.com
Swire					
AHSV	Ian Del Rosso	9430 5434	0412 928 275	9430 7849	idelrosso@spopty.com.au (9337 8906)
Tasman					
Drilling Tools	Bob Jones	9330 6155	0419 041 139	9330 1502	tas_rent@omen.com.au
Telstra					
Communications	Brian Morgan	9491 2416	0417 289 397	9486 7862	brian.morgan@team.telstra.com
Varel					
Bits	Roge Ryley	9315 9999	0412 047 390	9315 9800	rryley@varelintl.com
Weather News					
Weather	Rob Cowle	9899 3140	0414 330 578	9899 3141	rob@wni.co.jp
Weatherford					
Casing Running	Stuart Hendry	9212 4600	0418 902 336	9249 8200	stuart.hendry@weatherford.com

PE909000

This is an enclosure indicator page.
The enclosure PE909000 is enclosed within the container PE908999 at this location in this document.

The enclosure PE909000 has the following characteristics:

ITEM_BARCODE =	PE909000
CONTAINER_BARCODE =	PE908999
NAME =	Northright Prospect Montage Sheet
BASIN =	GIPPSLAND
ONSHORE? =	N
DATA_TYPE =	WELL
DATA_SUB_TYPE =	MONTAGE
DESCRIPTION =	Northright Prospect Montage Sheet, by Eagle Bay Resources N.L, W1319, VIC/P41. Enclosure contained within "W1319 Northright-1 Drilling Report" PE908999.
REMARKS =	
DATE_WRITTEN =	
DATE_PROCESSED =	
DATE_RECEIVED =	
RECEIVED_FROM =	Eagle Bay Resources N.L.
WELL_NAME =	Northright-1
CONTRACTOR =	
AUTHOR =	
ORIGINATOR =	
TOP_DEPTH =	
BOTTOM_DEPTH =	
ROW_CREATED_BY =	CD000_SW

(Inserted by DNRE - Vic Govt Mines Dept)