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**INTEQ**



## **END OF WELL REPORT**

**WOODSIDE ENERGY LTD**

**GEOGRAPHE NORTH - 1**

**September - October 2001**

**by**

**BAKER HUGHES INTEQ**

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# Woodside Energy Ltd: Geographe North-1

## Final Well Report

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# 1. Operations Summary

## 1.1 Introduction

Baker Hughes INTEQ Mudlogging provided formation evaluation, drill monitoring and pressure evaluation services for Geographe North-1 from spud until abandonment. Data was processed and stored using Drillbyte V.2.3.1 software. All depths in this report unless otherwise stated refer to mBRT - metres below rotary table.

Geographe North-1 was planned as a 2156-metre vertical exploration and appraisal well to evaluate the hydrocarbon occurrence and volumetric potential of the Flaxman and Waarre formations on the Geographe structure.

The well was spudded at 04:00 hours on 29 September 2001, drilling the 36" hole from the seabed at 107m to 163m using seawater and high viscosity prehydrated gel (PHG) sweeps. The 30" conductor casing was run with the swedged 20" shoe set at 162m. The 17.5" hole was then drilled riserless using seawater, with rates of penetration averaging 43m/hr. For hole cleaning guar gum sweeps were pumped every nine metres, with hi-viscosity gel sweeps pumped before each drillpipe connection to section TD of 565mBRT. The 13.375" casing was run with no problems and cemented with the casing shoe set at 557.8mBRT. The BOPs were then landed and tested as per programme.

While drilling out the surface casing shoe track, the 12.25" hole was displaced to a KCI/PHPA/Glycol (Aquadriil) water-based mud system, enhanced with Penetrex and Alplex mud additives and initially weighted to 1.14sg. There was evidence that drilled wiper plug material was wrapped around the bottom hole assembly causing the drillstring to pack-off. Eventually, seven metres of new formation was drilled and the string worked constantly to dislodge the wiper plug debris from the bottom hole assembly. The subsequent Leak-Off Test (LOT) performed at the shoe depth yielded an EMW of 2.01 sg. The 12.25" hole was drilled with a fixed cutter bit, mud motor and MWD tool, drilling from 565m to 1790mBRT with penetration rates averaging 81m/h. The pump flow rates were limited only by the cleaning capacity of the mud shaker screens. As a precautionary measure, the mud weight was raised to 1.25sg before reaching prognosed undercompacted massive claystone formations. At section TD the mud weight was further increased to 1.28sg to contain the borewall. While tripping out the bit, the hole was backreamed from 1415 - 932mBRT with overpulls of up to 150klbs recorded. A short wiper trip to the 13.375" casing shoe was made to condition the hole. The 10.75" x 9.625" casing was then run. While circulating the casing before cementing, increased pump pressures indicated either annulus or running tool circulating ports packing-off. After flushing the running tool with the kill line, circulation was re-established and the casing was eventually cemented with the shoe set at 1784mBRT.

The 8.5" hole was drilled with the KCI/PHPA/Glycol (Aquadriil) mud system initially weighted to 1.15sg. A Leak-Off Test (LOT) was performed at the shoe depth of 1797m, yielding an EMW of 1.85sg. Drilling continued from 1797m. No significant gas shows were seen in the reservoir section and so the decision was made to drill to TD rather than cut a core. The well's Total Depth of 2156m was reached at 16:30 hrs on 08 October 2001.

Following a shortened wireline logging programme, Geographe North-1 was then plugged and abandoned. The Ocean Bounty was towed off location on 12 October 2001.

## 1.2 Well and Rig Information

Well Name:	Geographe North-1	
Well Type:	Vertical Exploration / Appraisal	
Operator:	Woodside Energy Ltd.	
Location:	Offshore Otway Basin, offshore Victoria, Australia	
Block:	VIC/P43	
Final Coordinates:	Latitude	39° 04' 39.928" S
	Longitude	142° 54' 57.647" E
Rig:	Ocean Bounty	
Type:	Semi-submersible MODU	
Rig Floor - Seabed:	107 mBRT	
Rig Floor - MSL	25 mLAT	
Spud Date:	29 September 2001	
Total Depth:	2156 mBRT	
Status:	Plugged & Abandoned	
Baker Hughes INTEQ:	Data Engineers:	Romeo Tena Joseph Bardelosa Jeff Wilson Rommel Tadiar
	Logging Geologists:	Scott Curran Elaine Spence Rhys Graafhuis Natasha Mitchell

## **Section 2**

### **Drilling and Engineering**

## 2.1 Bit Run Summaries

### 36" Phase: 29 September 2001

#### Bit Run 1 Summary

Bit Number	RB 1
Bit Size	36"
Bit Type	Varel L111A
S/N	3546
Jets	6x32
Depth In, m	107
Depth Out, m	163
Metres Drilled	56
Drilling Hours	3.2
TBR, krevs	16.8
Circulating Hours	4.2
Average ROP, m/hr	17.5
API Condition	Not Graded

#### **Drilling Parameters**

WOB, tonnes	0.5 - 4.6
RPM	51 - 99
Torque kft-lbs.	0.5 - 0.9
Pump Pressure, psi	116 - 1234
Flow In, gpm	407 - 1162

#### **Mud System**

Seawater & hi-viscosity Gel Sweeps	1.03 sg
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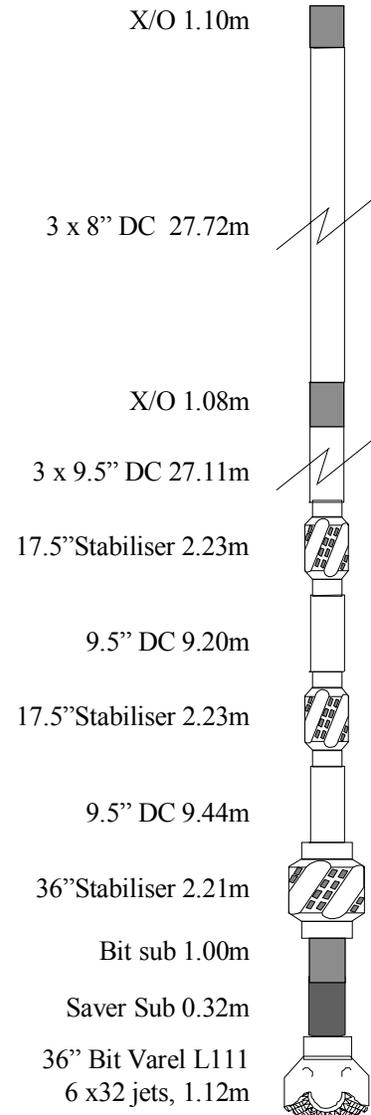
#### **Lithology**

Returns to seabed.

#### **Drilling Summary**

After running anchors, the TGB was run in with the 36" drilling assembly and set. The 36" bit tagged the seabed at 107m. Geographe North-1 was spudded at 04:00hrs on 29 September 2001. The section was drilled using seawater and hi-vis prehydrated gel (PHG) sweeps pumped every single joint of drillpipe. At section TD of 163m, the hole was swept clean and displaced with a 340bbls gel sweep. A TOTCO survey tool was then dropped (bottom hole inclination result: 1.75°) before the bit was pulled to surface to run the 30"/20" conductor casing.

### **BHA 1 85.70m**



**17.5" Phase : 29 September 2001****Bit Run 2 Summary**

Bit Number	RB 2
Bit Size	17.5"
Bit Type	Varel ETR1GJ
S/N	152878
Jets	1x14, 2x20
Depth In, mRT	163m
Depth Out, mRT	565m
Metres Drilled	402m
Drilling Hours	9.3
TBR, krevs	69.9
Circulating Hours	11.5
Average ROP, m/hr	43.4
API Condition	1-1-WT-A-E-1-NO-TD

**Drilling Parameters**

WOB, tonnes	0.4	-	12.4
RPM	51	-	142
Torque kft-lbs.	1.2	-	4.61
Pump Pressure, psi	606	-	3415
Flow In, gpm	520	-	1190

**Mud System**

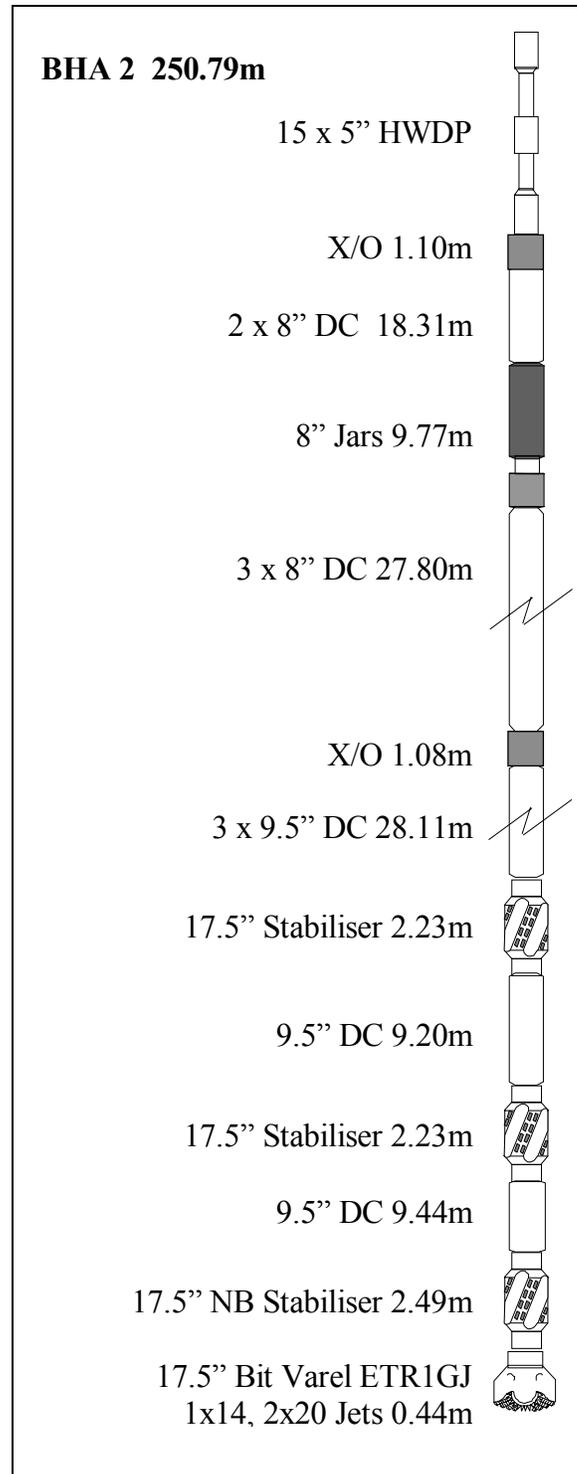
Seawater & hi-viscosity Gel	1.03 sg
Sweeps	

**Lithology**

Returns to seabed.

**Drilling Summary**

RB 2 was made up to a packed drilling assembly, run in and washed down to tag cement at 161m. After drilling out the cement and the 20" casing shoe at 162m, new formation was drilled from 163m with a 50bbls guar gum sweep pumped at about 600 gpm after the first 10 metres drilled. The pump rate was increased to 800-1200 gpm and surface rotary to 140 rpm to optimize penetration rates. To clean the hole, two 75bbls guar gum sweeps were pumped every nine metres drilled, alternating with 100bbls prehydrated gel (PHG) prior to every connection. Penetration rates averaged 43.4m/hr. There were no indications of hole pack-off or shallow gas while drilling. Section TD was reached at 565mBRT. At TD, the hole was swept using a 200 bbls havis PHG mud circulated out with seawater while rotating and working the pipe. The hole was displaced with a 260bbls Gel/Drispac SL pill, chased with 270 bbls of weighted 1.15sg inhibited KCl pill left on bottom. The bit was then pulled out of the hole to run the 13.375" casing.



**12.25" Phase: 02 - 05 October 2001****Bit Run 3 Summary**

Bit Number	NB 3
Bit Size	12.25"
Bit Type	Smith MA985
S/N	JS4096
Jets	7 x 12
Depth In, mRT	565
Depth Out, mRT	1790
Metres Drilled	1225
Drilling Hours	31.7
TBR, krevs	340.3
Circulating Hours	56.4
Average ROP, m/hr	38.6
API Condition	2-4-BT-T-X-I-CT-TD

**Drilling Parameters**

WOB, mt	0.3	-	17.2
RPM (surface + motor)	117	-	202
Torque kft-lbs.	1.3	-	12.0
Pump Pressure, psi	993	-	3104
Flow In, gpm	412	-	987

**Mud System**

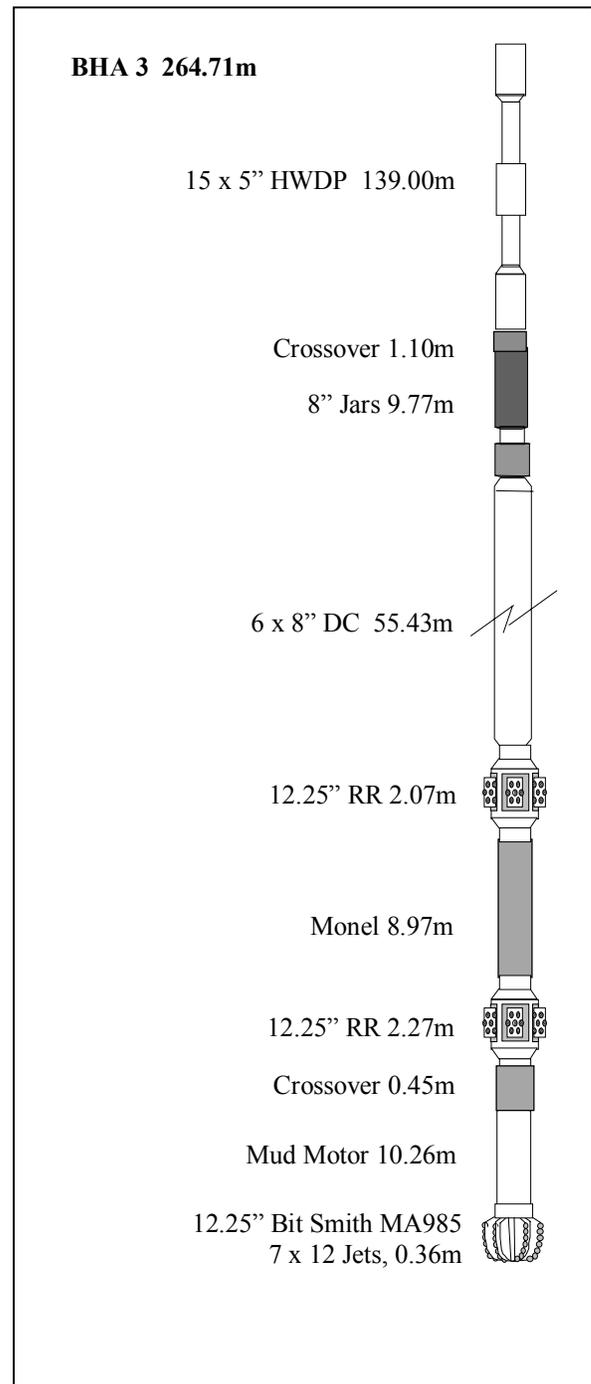
KCI / PHPA /Glycol (Aquadriil) w/ Penetrex & Alplex below 1399m	1.15	-	1.28 sg
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**Lithology**

Calclutite, Claystone, Siltstone & Sandstone

**Drilling Summary**

After running BOPs and marine riser, NB 3 was made up to a mud motor with MWD tool and run in, tagging cement at 531m. While drilling out the shoe at 557m, the hole was displaced to a 1.14 sg KCI/PHPA/Glycol (Aquadriil) system. Seven metres of new hole was drilled prior to the Leak-Off Test in an attempt to dislodge wiper plug material around the bottom hole assembly which was causing abnormally high pump pressures, or pack-off, in the annulus. An Equivalent Mud Weight (EMW) of 2.01sg was recorded during the LOT. Drilling resumed with occasional havis mud sweeps to aid in hole cleaning. The mud weight was then increased to 1.25sg by 1037m as a safety precaution. At the section TD of 1790m, the hole was circulated clean, and the mud system was raised to a 1.28sg. Pipe drag, with overpulls of up to 150klbs, were recorded in the interval 1413 - 932m while backreaming to the casing shoe. A 50bbbls caustic pill was pumped around the BHA before running back in the hole after servicing the TDS. At 1700m, the bit was washed and reamed back to bottom, tagging fill at 1780m. A 60bbbls pill was swept around the hole and the hole was circulated until the shakers were clean. After a



flowcheck, the bit was pulled out of the hole, with one tight spot at 1705m causing 20klbs overpull. Once at surface, preparations for running the 10.75" x 9.625" casing were made.

## 8.5" Phase: 07 - 08 October 2001

### Bit Run 4 Summary

Bit Number	NB 4
Bit Size	8.5"
Bit Type	Smith MA89PX
S/N	JS6303
Jets	6 x 12
Depth In, mBRT	1790
Depth Out, mBRT	2156m TD
Metres Drilled	366
Drilling Hours	11.3
TBR, krevs	94.1
Circulating Hours	16.1
Average ROP, m/hr	32.4
API Condition	3-2-WT-N-X-I-CT-TD

### Drilling Parameters

WOB, mt	1.4	-	12.7
RPM	57	-	161
Torque kft-lbs.	1.3	-	8.6
Pump Pressure, psi	771	-	3801
Flow In, gpm	170	-	784

### Mud System

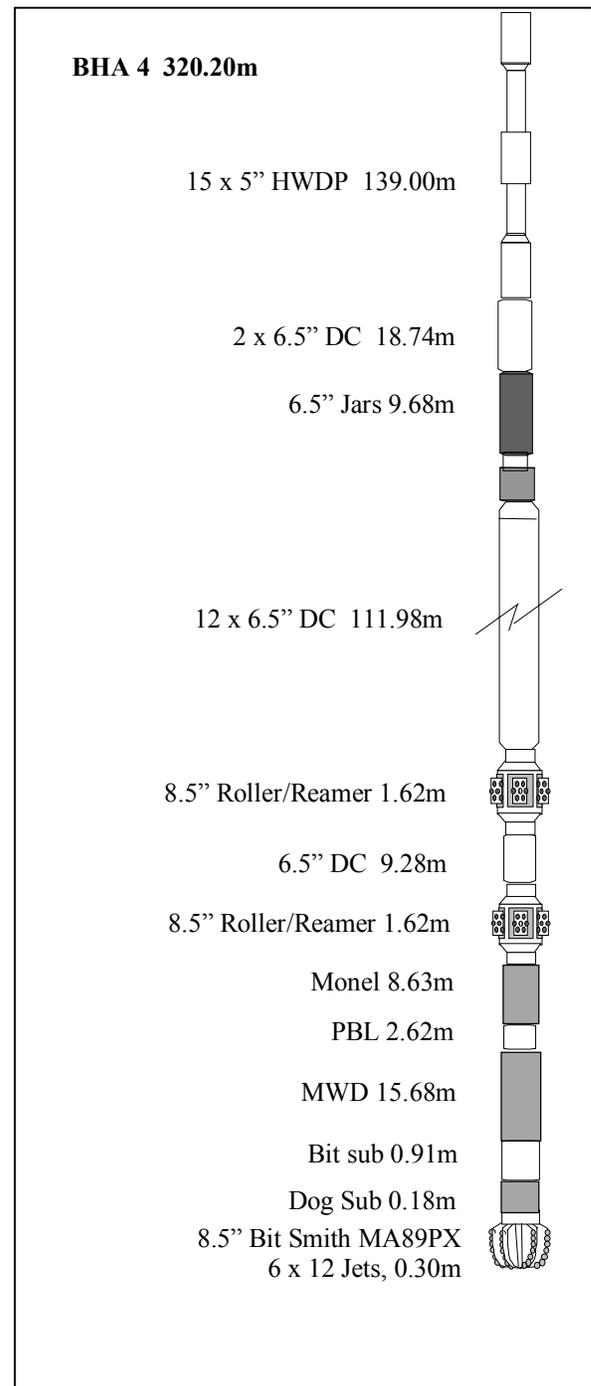
KCI / PHPA /Glycol (Aquadrill)	1.15	-	1.16 sg
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### Lithology

Claystone, Sandstone & Siltstone

### Drilling Summary

NB4 was made up with a directional-gamma-resistivity-sonic-density tool and run in tagging the top of cement at 1752m. While drilling out the shoe track and casing shoe at 1784mBRT, the hole was displaced to Aquadrill mud with a weight of 1.15sg. After cleaning out the rathole, seven metres of new formation was drilled to 1797m. A 50bbl high viscosity pill was swept around the hole. Due to poor weather conditions, the well was flowchecked and five stands of drillpipe pulled out in order to run the hang-off tool. After waiting on weather for 1.25 hours the hang-off tool was pulled out and the bit run back to the casing shoe. The hole was circulated for some time before a Leak-Off Test was performed, with a surface pressure of 1977 psi with 1.15sg mud yielding an Equivalent Mud Weight (EMW) of 1.85sg. Drilling continued from 1797m to look for a potential core point. A total gas peak of 3.13% was recorded at 1888mBRT but as no other significant gas shows were seen, the decision was made to drill ahead. Flowchecks were made at drillbreaks at 2075m and 2140mBRT, both yielding static results. Geographe North-1's Total Depth of 2156mBRT was reached at 16:30 hours on 08 October 2001. Two 50bbls high viscosity pills were swept around



the hole. After the well was flowchecked, the bit was pulled out of the hole. No hole problems were encountered on the trip out. Once at surface, the bit was laid out and preparations were made to run wireline logs.

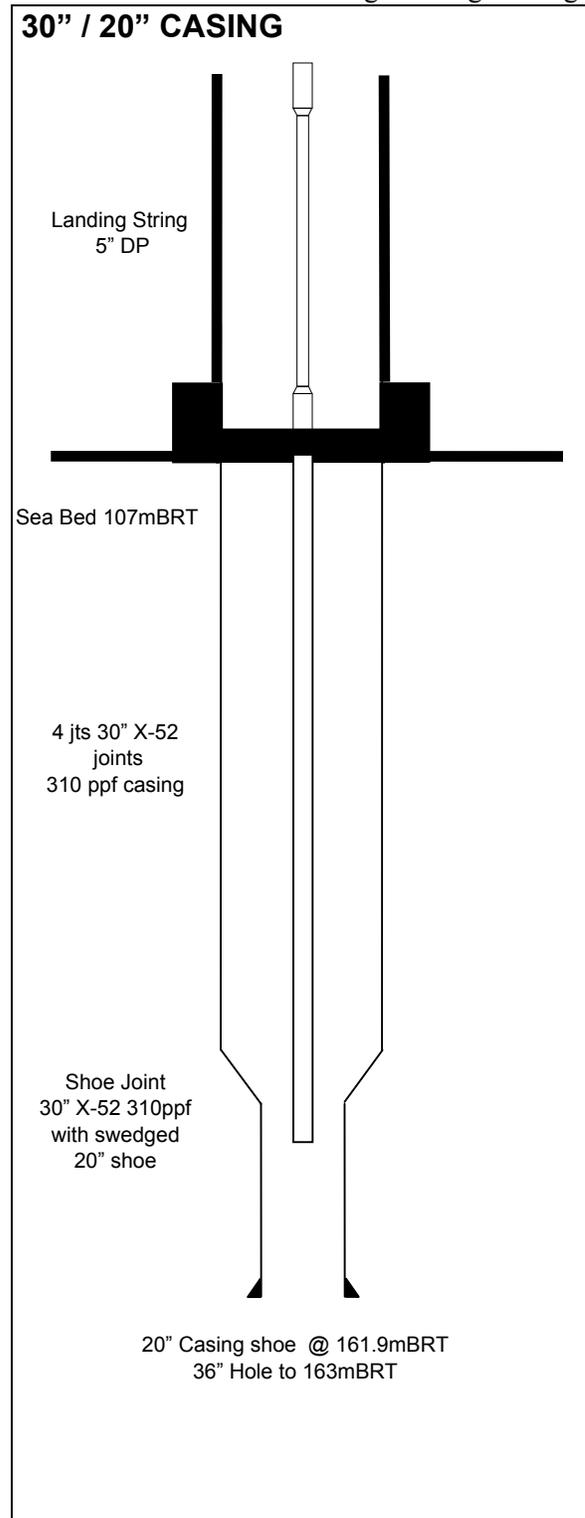
## 2.2 Casing and Cementing Summaries

### 30" / 20" Casing

Hole Size	36"
Depth	163m
Casing	
OD	30" / 20"
ID	27"
Weight	310 lb/ft
Shoe Depth	161.9m
Cement	Single Stage, Tail
Type	Class G
Sacks	1200 sxs
Slurry Density	1.91 sg
Mix Water	5.15 gal/sx
Yield	1.16 ft <sup>3</sup> /sx

### **Summary**

The 30" conductor casing with 20" swaged shoe joint assembly and PGB was filled with seawater and run in smoothly. The PGB angle was 0.5 degree aft after landing. The lines were tested good to 1000 psi for 5 minutes. Ten bbls water with fluorescent dye was pumped prior to the slurry. The cement was pumped in as planned although delivery problems hampered the cementing job. ROV observed good cement returns throughout the job. The cement was displaced using the Halco pump unit. No backflow was observed.

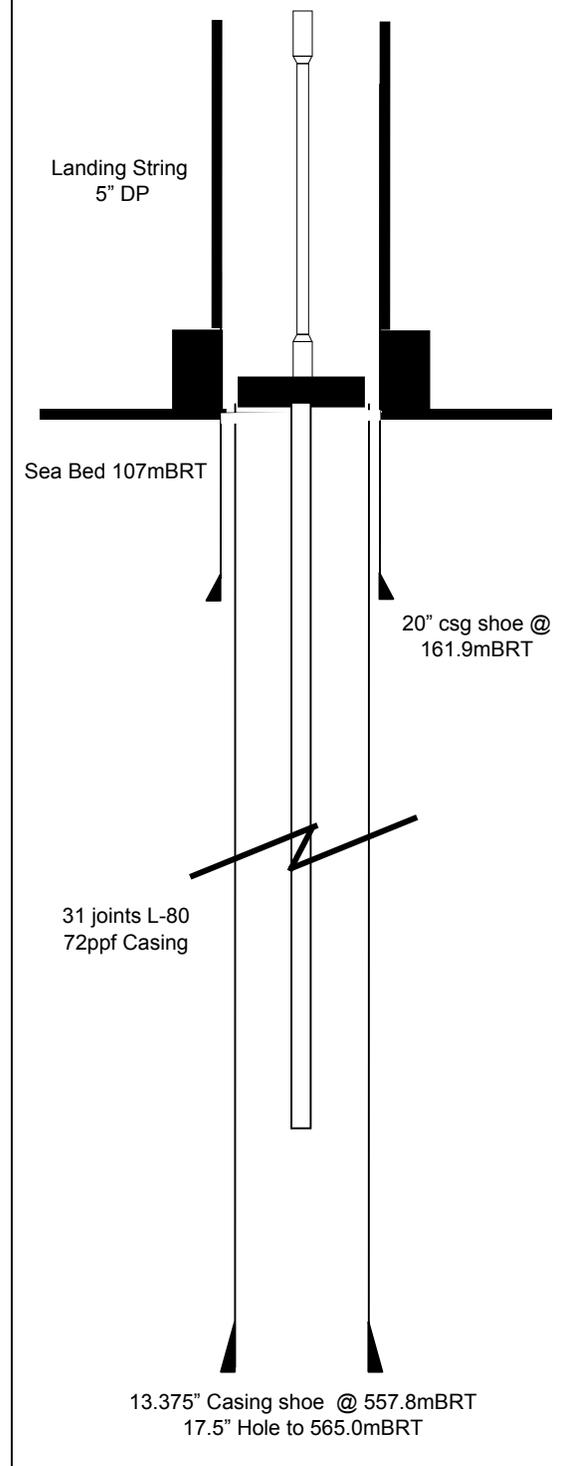


**13.375" Casing**

Hole Size	17.5"
Depth	565m
Casing	
OD	13.375"
ID	12.347"
Weight	72 lb/ft L-80 BTC
Shoe Depth	557.8m
Cement	Lead Slurry
Type	class"G"
Sacks	680 sx
Slurry Density	1.5 sg
Mix Water	12.5 gal/sx
Yield	2.23 ft <sup>3</sup> /sx
Additives	Econolite - 0.62gal/sx
Cement	Tail Slurry
Type	class"G"
Sacks	433sx
Slurry Density	1.9 ppg
Mix Water	5.17 gal/sx
Yield	1.16 ft <sup>3</sup> /sx

**Summary**

Thirty-one joints of 9.625" casing including the shoe and housing joint were run and landed with the shoe at 557.8m. The 18.75" wellhead to 30" housing connection was confirmed with the slack-off string weight checked against the tally sheet. The surface lines were tested OK to 3500psi. The first dart was dropped and 10bbls fluorescent dyed water pumped, followed by 270 bbls 1.5 sg lead slurry and then 90bbls 1.91 sg tail slurry (class G) at 7bbl per minute (bpm) with 500psi pump pressure. The bottom dart landed out after 7.2 bbl was pumped and the bottom plug released at 1400 psi. The top dart was released, chased with mud and landed on the top plug after the required volume was pumped down. The top plug sheared out at 1900 psi. The cement was displaced with 208 bbls seawater using the rig pumps. The top plug was bumped with 700psi pump pressure. Fluorescent dye and cement were observed at the seabed. The casing was then tested to 3500psi for 10 minutes after bumping the plug.

**13.375" CASING**

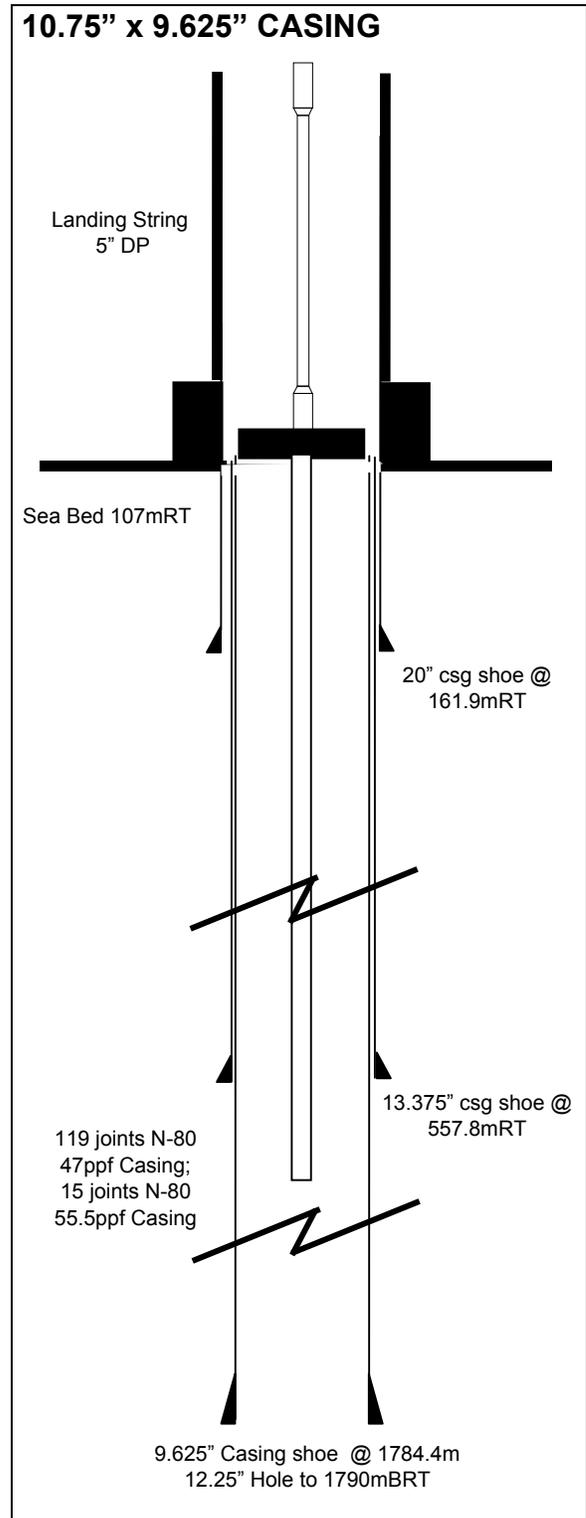
dart was released and landed on the top plug after 6.3bbbls. The top plug was sheared out at 2600psi. The cement was displaced with 417bbbls 1.28sg mud. The plug was bumped with 1400 psi, held for 5 mins and released with the floats holding OK. The casing was tested to 3500psi for 10 minutes.

**10.75" / 9.625" Casing**

Hole Size	12.25"
Depth	1790m
Casing	
OD	10.75" x 9.625"
ID	9.76" x 8.681"
Weight	55.5 lb/ft N-80 New VAM
	47.0 lb/ft N-80 New VAM
Shoe Depth	1784.4m
Cement	
Type	Lead Slurry class"G"
Sacks	459 sx
Slurry Density	1.5 sg
Mix Water	12.5 gal/sx
Yield	2.14 ft <sup>3</sup> /sx
Additives	
Liquid Additive Ext.	2 gal/bbl
D-air 3000L	0.025 gal/bbl
Cement	
Type	Tail Slurry class"G"
Sacks	271sx
Slurry Density	1.9 sg
Mix Water	5.16 gal/sx
Yield	1.16 ft <sup>3</sup> /sx
Additives	
HR-6L	0.2 gal/bbl
HALAD 413L	2 gal/bbl
D-air 3000L	0.025 gal/bbl

**Summary**

One hundred-nineteen joints of 9.625" and 15 joints 10.75" casing including the shoe and housing joint were run with the shoe at 1784.4mBRT. The 10.75" casing hanger landout on the 18.75" wellhead landing shoulder was confirmed and the seal assembly latched. Circulation was broken and whilst attempting to pump at 12bpm the pressure increased to 1200psi indicating the annulus or running tool circulating ports packing-off. The casing string was picked up to re-establish circulation. Continued attempts to maintain circulation were unsuccessful. The hanger running tool was flushed via the kill line to dislodge any debris. Circulation was then re-established at 10bpm and 650psi. The hole continued to show signs of packing-off and the running tool was flushed numerous times. A total of 1500bbbls of mud was circulated prior to the cement job over 4 hours. The cement unit pumped 10bbbls of drillwater and the surface lines were tested to 4000psi for 5 minutes. The bottom dart was dropped and the 175bbbls 1.5 sg lead slurry followed by 56bbbls 1.9sg tail slurry, was mixed and pumped at 7.5-8bpm with 750-950 psi pumping pressure. The bottom dart landed at the bottom plug after pumping 6.3bbl and the bottom plug released at 1700 psi. After the total required cement volume was pumped the top



## **Section 3**

### **Geology and Shows**

## GEOLOGY AND SHOWS

Formation Evaluation for Geographe North-1 commenced from below the 13.375" casing shoe at 558mBRT to the well's Total Depth of 2156mBRT. Sampling rates were dependent on rate of penetration. Washed cuttings samples were collected at the following intervals:

From (m)	To (m)	Sampling Interval (m)
565	590	5
590	600	10
600	610	5
610	1080	10
1080	1110	30
1110	1400	10
1400	1790	5
1790	1910	3
1910	2156	6

During the course of the well, all gas equipment was checked and calibrated before drilling. Carbide tracers were run at 1249m and 1684m to ensure lag times were correct. Cuttings samples were analysed for calcimetry data as requested by the WEL Wellsite Geologists.

The lithological units observed during the drilling of Geographe North-1 are described below. For more detailed descriptions, see Appendix-1, Formation Evaluation Log.

### 36" HOLE SECTION

**Seabed to 163mBRT: Returns to Seabed**

### 17.5" HOLE SECTION

**163m to 565mBRT: Returns to Seabed**

### 12.25" HOLE SECTION

**565m to 595mBRT: ARGILLACEOUS CALCILUTITE**

**ARGILLACEOUS CALCILUTITE:** Light grey to medium light grey, medium grey, firm, friable, subblocky to blocky, common glauconite specks, rare Echinoid spines, trace Foraminifera, trace pyrite, trace siderite and trace crystalline calcite.

There were no oil shows in this interval.

**595m to 670mBRT : ARGILLACEOUS CALCILUTITE and ARGILLACEOUS CALCARENITE**

**ARGILLACEOUS CALCILUTITE:** Medium light grey to light grey, soft to firm, subblocky to blocky, rare crystalline calcite, trace glauconite, trace siderite, trace Foraminifera and fossil fragments.

**ARGILLACEOUS CALCARENITE:** Light grey, light brownish grey, light brown to moderate brown, firm to hard, subblocky to blocky, rare crystalline calcite, trace orange stained calcite cement, trace glauconite specks, trace Foraminifera and trace fossil fragments.

There were no oil shows in this interval.

**670m to 700BRT: ARGILLACEOUS CALCILUTITE**

**ARGILLACEOUS CALCILUTITE:** Medium light grey to light grey, soft to firm, subblocky to blocky, rare crystalline calcite, trace glauconite, trace siderite, trace Foraminifera and fossil fragments.

There were no oil shows in this interval.

**700m to 730mBRT: ARGILLACEOUS CALCILUTITE with interbedded CALCAREOUS CLAYSTONE**

**ARGILLACEOUS CALCILUTITE:** Medium light grey to light grey. soft to firm, subblocky to blocky, rare crystalline calcite, trace glauconite, trace siderite, trace Foraminifera and fossil fragments.

**CALCAREOUS CLAYSTONE:** Light grey to medium light grey, medium dark grey, firm to hard, blocky, occasionally fissile and also contains trace fossil fragments.

There were no oil shows in this interval.

**730m to 1000mBRT: SANDSTONE**

**SANDSTONE:** Greyish brown, blackish red to very dusky red, dark to pale yellowish orange, dusky brown to dusky yellowish brown stained, clear, translucent, milky and resinous quartz grains, loose, medium to very coarse grained, subangular to well rounded, elongate to subspherical, poorly to moderately well sorted, rare dark grey silt matrix, rare to trace pyrite nodules, rare pyrite and iron cement, trace marcasite cement, trace well rounded jasper nodules, trace siderite, trace glauconite nodules, trace CARBONACEOUS SILTSTONE, poor to fair inferred porosity.

There were no oil shows in this interval.

**1000m to 1205mBRT: SANDSTONE with interbedded ARGILLACEOUS SILTSTONE and minor interbedded SILTSTONE**

**SANDSTONE:** Olive black to brown black, dark grey, translucent and clear quartz grains, loose, very fine to very coarse, predominantly fine to medium, subelongate to subspherical, rounded to subangular, poor to moderate sorting, moderately strong calcite cement, trace to minor pyrite, trace glauconite, trace carbonaceous material, poor to fair inferred porosity, in parts grading to CARBONACEOUS SILTSTONE.

**ARGILLACEOUS SILTSTONE:** Olive grey to olive black, brownish black, dark grey, dispersive to sticky, amorphous, minor pyrite nodules, trace carbonaceous material and trace glauconite, grading to SILTY CLAYSTONE in places.

**SILTSTONE** (This lithology occurs at the top of this interval): Greyish black, olive black, plastic, sticky, amorphous, trace disseminated pyrite and trace carbonaceous material.

There were no oil shows in this interval.

**1205m to 1300mBRT: SILTY CLAYSTONE interbedded with minor SILTSTONE**

**SILTY CLAYSTONE:** Olive grey to brownish grey, dark grey, dark brownish grey, sticky, amorphous, minor very fine quartz grains, trace glauconite, trace pyrite and trace carbonaceous material.

**SILTSTONE** (This lithology occurs at the end of this interval): Dark grey, dark brownish grey, soft, blocky, trace carbonaceous material, trace fine quartz grains

There were no oil shows in this interval.

**1300m to 1380mBRT: CLAYSTONE interbedded with ARGILLACEOUS SILTSTONE and SANDSTONE**

**CLAYSTONE:** Olive grey, brownish grey to dark grey, sticky, amorphous, trace carbonaceous material, trace micromicaceous specks, trace pyrite and trace glauconite.

**ARGILLACEOUS SILTSTONE:** Olive grey, brownish black, olive black, soft to moderately hard, subblocky, trace glauconite, trace carbonaceous material, trace microlaminations, trace pyrite cement.

**SANDSTONE:** Light grey to medium light grey, very fine to fine, translucent to opaque quartz grains, subangular to subrounded, poorly sorted, trace calcite cement and trace carbonaceous material, poor visual porosity, poor inferred porosity.

There were no oil shows in this interval.

**1380m to 1425mBRT: ARGILLACEOUS SILTSTONE and SANDSTONE**

**SILTSTONE:** Very dusky red, dusky yellowish brown, dusky brown, dark reddish brown, brownish grey, very soft to soft, occasionally moderately hard, amorphous to subblocky, clay matrix, trace carbonaceous laminations, trace very fine quartz grains

**SANDSTONE:** Light grey to medium light grey, very fine to fine, translucent to opaque quartz grains, subangular to subrounded, poorly sorted, trace calcite cement, trace carbonaceous material, poor visual porosity.

There were no oil shows in this interval.

**1425m to 1475mBRT: CLAYSTONE with interbedded SILTSTONE and minor SANDSTONE**

**CLAYSTONE:** Olive black dusky yellowish brown, dusky brown, brown grey, soft, dispersive, amorphous, trace carbonaceous material.

**SILTSTONE:** Dark reddish brown, brownish grey, soft to moderately hard, subblocky, clay matrix, trace carbonaceous material, trace very fine quartz grains.

**SANDSTONE:** Clear to translucent, quartz grains, very fine to fine, subangular to subrounded, poorly sorted, trace pyrite nodules, trace carbonaceous material, poor visual porosity, poor inferred porosity.

There were no oil shows in this interval.

**1475m to 1600mBRT CLAYSTONE with interbedded SILTSTONE**

**CLAYSTONE:** Olive black, dusky yellowish brown to dusky brown, dark grey, brownish grey, moderate brown, firm to moderately hard, occasionally soft and dispersive, subblocky to blocky, trace carbonaceous material, trace glauconite nodules.

**SILTSTONE:** Dark grey with greenish black laminations, firm to hard, subblocky to blocky, trace carbonaceous material and laminations, trace glauconite, trace calcite, trace very fine quartz grains.

There were no oil shows in this interval.

**1600m to 1790mBRT SILTY CLAYSTONE with interbedded SILTSTONE and minor SANDSTONE**

**SILTY CLAYSTONE:** Dusky brown, brownish black, brownish grey, soft, occasionally firm, amorphous, occasionally laminated with trace carbonaceous material, trace glauconite, trace fossil fragments, trace crystalline calcite.

**SILTSTONE:** Dark grey to greyish black, olive black, dusky brown and with olive black laminations, firm to hard, subblocky to blocky, rare glauconite, trace carbonaceous material, trace fossil fragments, trace very fine quartz grains, trace pyrite nodules.

**SANDSTONE:** This lithology occurs only at the top of this interval, clear to translucent quartz grains, very fine to fine, subrounded to rounded, subspherical to subelongate, well sorted, trace pyrite cement, trace fossil fragments, poor inferred porosity.

There were no oil shows in this interval.

**8.5" HOLE SECTION****1790m to 1850mBRT: CLAYSTONE**

**CLAYSTONE:** Olive grey, brownish grey, very soft to soft, amorphous to subblocky, minor to locally abundant glauconite, trace pyrite nodules, trace carbonaceous material, grading to SILTSTONE in places.

There were no oil shows in this interval.

**1850m to 1928mBRT: CLAYSTONE with interbedded SANDSTONE**

**CLAYSTONE:** Olive grey, brownish grey, very soft to soft, amorphous to subblocky, minor to locally abundant glauconite, trace pyrite nodules, trace carbonaceous material, grading to SILTSTONE in places.

**SANDSTONE:** Light grey, firm to friable aggregates, very fine to fine, predominantly very fine quartz grains, subangular to subrounded, subspherical, well sorted, rare argillaceous matrix, trace silica cement, trace pyrite nodules and cement, trace lithic fragments, poor visual porosity, very poor to poor inferred porosity.

There were no oil shows in this interval.

**1920m to 1955mBRT: SILTSTONE with minor CLAYSTONE and SANDSTONE**

**SILTSTONE:** Medium dark grey to dark grey, firm to occasionally hard, subblocky to blocky, trace carbonaceous material, trace very fine quartz grains.

**CLAYSTONE:** Olive grey to brownish grey, very soft to soft, firm in parts, amorphous to subblocky, trace carbonaceous material, grading to SILTSTONE in places.

**SANDSTONE:** Very light grey to light grey, clear to translucent quartz grains fine to coarse, occasionally very coarse, predominantly subangular, occasionally subrounded, subelongated to subspherical, poor to moderately well sorted, common pyrite cement and nodules, weak silica cement, trace amounts of light yellow amber, poor visual porosity, poor inferred porosity.

There were no oil shows in this interval.

**2008m to 2156mTD: SANDSTONE with minor interbedded SILTSTONE**

**SANDSTONE:** Very light grey to light grey, translucent to opaque, rarely orange stained quartz grains, fine to coarse grained, occasionally very coarse, commonly fractured quartz grains, very angular to subrounded, subelongate to subspherical, very poor to poorly sorted, rare friable aggregates with weak siliceous cement, occasional carbonaceous silty matrix, trace pyrite cement, trace pyrite nodules, poor visual porosity, poor inferred porosity.

**SILTSTONE:** Brownish black to olive black, brownish grey, occasionally very dark red, soft to moderately hard, amorphous to subblocky, minor very fine to fine quartz grains, common disseminated pyrite, common carbonaceous laminae, grading into CARBONACEOUS SILTSTONE in upper parts of this interval.

There were no oil shows in this interval.

<b>Drilling rate summary for all lithological intervals on Geographe North- 1</b>			
<b>Depth Interval (m)</b>	<b>RATE OF PENETRATION (m/hr)</b>		
	<b>Minimum</b>	<b>Maximum</b>	<b>Average</b>
565-595	11.4	132.5	46.3
595-670	15.1	532.3	139.8
670-700	17.1	312.7	167.6
700-730	29.2	289.1	170.5
730-1000	14.6	563.8	146.1
1000-1205	7.5	276.9	66.2
1205-1300	16.8	123.4	46.3
1300-1380	2.7	189.5	70.3
1380-1425	5.5	63.7	26.8
1425-1475	7.7	76.1	27.0
1475-1600	17.3	100.1	48.1
1600-1790	7.2	77.8	33.3
1790-1850	6.6	74.0	30.3
1850-1928	6.6	113.0	37.7
1928-2008	6.5	158.8	56.9
2008-2156	15.0	174.1	55.1

Summary of gas readings recorded for all lithological intervals on Geographe North- 1													
Interval (m)		Total Gas (%)				Chromatograph Analysis (%)							
		Range		Max Gas at (m)	Av. Total Gas		C1	C2	C3	iC4	NC4	iC5	nC5
From	To	From	To										
0	565	Returns to Seabed				Min	-	-	-	-	-	-	-
						Max	-	-	-	-	-	-	-
565	595	0.01	0.01	565-595	0.01	Min	0.004	-	-	-	-	-	-
						Max	0.008	-	-	-	-	-	-
595	670	0.01	0.01	595-670	0.01	Min	0.002	-	-	-	-	-	-
						Max	0.010	-	-	-	-	-	-
670	700	0.01	0.01	670-700	0.01	Min	0.003	-	-	-	-	-	-
						Max	0.007	-	-	-	-	-	-
700	730	0.01	0.01	700-730	0.01	Min	0.004	-	-	-	-	-	-
						Max	0.006	-	-	-	-	-	-
730	1000	0.02	0.02	980-986	0.01	Min	0.003	-	-	-	-	-	-
						Max	0.013	-	-	-	-	-	-
1000	1205	0.01	0.05	1196	0.02	Min	0.005	-	-	-	-	-	-
						Max	0.029	-	-	-	-	-	-
1205	1300	0.01	0.09	1285 1286	0.05	Min	0.019	-	-	-	-	-	-
						Max	0.072	-	-	-	-	-	-
1300	1380	0.03	0.14	1317 1318	0.07	Min	0.019	-	-	-	-	-	-
						Max	0.119	-	-	-	-	-	-
1380	1425	0.03	0.08	1352 1353	0.05	Min	0.019	-	-	-	-	-	-
						Max	0.058	-	-	-	-	-	-
1425	1475	0.04	0.07	1429 1470	0.05	Min	0.019	-	-	-	-	-	-
						Max	0.049	-	-	-	-	-	-
1475	1600	0.05	0.08	1499-1504	0.05	Min	0.036	-	-	-	-	-	-
						Max	0.064	-	-	-	-	-	-
1600	1790	0.05	0.08	1650-1667 1688-1694	0.06	Min	0.025	-	-	-	-	-	-
						Max	0.046	-	-	-	-	-	-
1790	1850	0.04	0.07	1830	0.05	Min	0.015	-	-	-	-	-	-
						Max	0.043	-	-	-	-	-	-
1850	1928	0.043	3.00	1888	0.21	Min	0.022	-	-	-	-	-	-
						Max	2.837	0.29	0.027	0.003	0.002	-	-
1928	2008	0.08	0.14	1983-1984	0.11	Min	0.06	0.005	0.003	-	-	-	-
						Max	0.107	0.008	0.005	-	-	-	-
2008	2156	0.02	0.22	2138	0.10	Min	0.010	-	-	-	-	-	-
						Max	0.212	0.012	0.008	-	-	-	-



**SAMPLES IN CONTAINER: OPC207**

SAMPLE TYPE	No. of Sets	COMPOSITION			PACKING DETAILS	
		Sample Box No.	Depth Interval (m)			
			From	To		
<b>Sets A,B,C,D,E (200 g) : Washed &amp; Air Dried</b>	5	1	565	770	Small Boxes 1-12 are packed in 3 Shipping boxes	
		2	770	1010		
		3	1010	1250		
		4	1250	1445		
			5	1445		1565
			6	1565		1690
			7	1690		1790
			8	1790		1838
			9	1838		1901
			10	1901		2018
			11	2018		2102
			12	2102		2156
<b>Set F (30 g) : Washed &amp; Air Dried FIS (Fluid Inclusion Study)</b>	1	1	565	1250	Small Boxes 1-4 are packed in 1 Shipping boxes. Small box 5 is single Large Box No. 1: 4 small boxes: 565-1982m	
		2	1250	1650		
		3	1650	1850		
		4	1850	1982		
		5	1982	2156		
<b>Set 7: Mud Samples 50 ml Pyrex bottles</b>	1	1	565	2156	1 x Small Boxes	
<b>Set 8: Samplex Trays</b>	1	1	565	2156	Wooden box 1: 565-2156	
<b>Sets 9: Charts / worksheets</b>	1	1	565	2156	1 Large Box	
<b>Set 10: Ditch Gas Samples</b>	1	1			1 x Large Box: Contains x 4 gas bags	

**ALL BOXES TO BE SENT TO WOODSIDE WAREHOUSE FOR ONWARD DISTRIBUTION:**

DISTRIBUTION	Destination & Address	Attention of:
<b>Washed &amp; Dried Set A: BRS (AGSO)</b>	<b>BRS, c/o AGSO Building</b> Cnr. Jerrabomberra Ave & Hindmarsh Dr Symonston, ACT 2609	Mr E. Resiak Note: to be forwarded as per BRS sample submission form
<b>Washed &amp; Dried Set B: VIC DNRE</b>	<b>DNRE Core Sample Library</b> South Rd. (off Sneydes Rd) Werribee, Victoria, 3030	Note: to be forwarded to VIC DNRE
a) <b>Washed and Dried Sets C, D &amp; E:</b> b) <b>Set 8: Samplex Trays</b>	<b>WEL</b> c/o Core Laboratories 447-449 Belmont Ave Kewdale, WA 6105	Gary Kemp
a) <b>Set 7: Mud Samples</b> b) <b>Set 10: (MGIL)</b>	<b>Core Laboratories, Perth</b>	Forward to Geotech fridge Forward to Geotech
a) <b>Set F: Washed and Dried (30g) FIS</b> b) <b>Set 9: Charts &amp; Worksheets</b>	<b>Core Laboratories, Perth</b>	Forward to Ops Geologist Mike Rapaic, WEL, Perth
<b>Sidewall Cores</b>	Operations Geologist, WEL, Perth	Handcarried by WSG

## **Section 4**

### **Pressure Evaluation**

## 4.1 PORE PRESSURE EVALUATION

An average sea water density of 1.03 sg was assumed as the normal saline pressure gradient for all calculations for Geographe North-1. Using real-time data, such as the hydrocarbon gas trend, lithology, flowline temperature, character of drilled cuttings, drilling fluid parameters, corrected drilling exponent (DxC) data and, when available, real-time MWD data including resistivity data, pore pressure estimates were made during the drilling of Geographe North-1. For more details, please refer to Appendix 3, "Pressure Summary Plot". Corrected drilling exponent (Dxc) data collected while drilling was not reliable for the 12.25" and 8.5" sections of the well, due to the use of fixed cutter bits.

### 36" Hole Section

The 36" hole was drilled from seabed at 107m to 163mBRT with a conventional tricone bit. The section was short, with returns dumped to the seabed. With an average penetration rate of about 17.5m/hr and low weight-on-bit, the plotted Dxc data curve showed initially a near-vertical trend then a rightwards trend with depth. This trend indicated a normal pore pressure in shaley formations. The variations in the penetration rates, 2.6 - 72.0m/hr and the Dxc range, from 0.34 - 1.25 units over this shallow interval, were due to the varying drillability of the lithologies ranging from very soft, possibly unconsolidated sediments to cemented limestone boulders. The pore pressure was estimated to be normal at 1.03 sg EMW from the seabed down to 163mBRT.

### 17.5" Hole Section

This section was drilled from 163m to 565mBRT with a conventional tricone bit. As in the 36" section, pore pressure estimates were based on the Dxc curve, penetration rate and the behaviour of available drilling parameters (torque and pump pressure), since drilling was done riserless and returns were dumped at the seabed. The Dxc continued the rightward trend from 163m to 410m with a scatter range of 0.34 - 1.23 units, coinciding with penetration rates ranging from 11 - 304 m/hr, averaging 47.2m/hr. The section was prognosed to comprise soft, possibly unconsolidated sediments and cavernous limestones where drilling was a combination of jetting and bit cutting. From 410m to 565mBRT the Dxc curve steepened to a near-vertical trend (0.72-1.25 units), though maintaining an overall rightward trend. The penetration rates slowed to an average 37.8m/hr, possibly marking a transition to more consolidated, compacted lithologies of the prognosed marl, siltstones and claystones. Hole cleaning during drilling was maintained by circulating guar gum sweeps every 9 metres drilled and the spotting of prehydrated gel pills before each pipe connection. There were no abnormal torque, drag or other hole problems observed throughout the section. The pore pressure was estimated to be normal at 1.03sg EMW from 163 down to 565m.

### 12 .25" Hole Section

The 12.25" hole section was drilled with a fixed cutter bit, in combination with a mud motor and MWD tool, from 565mBRT to the 9.625" casing point at 1790mBRT. While drilling the casing shoe, the hole was displaced to a KCl/PHPA/Glycol (Aquadrill) water-based mud system weighing 1.14sg. Additions of Penetrex and Alplex mud chemicals occurred during the drilling of this section. Pore pressure estimation in this section, due to the use of the PDC bit and mud motor, was based on the relationship of mud weight, background gas, occurrence of cavings, flowline temperature and drilling parameters, rather than corrected drilling exponent (Dxc) data. Lithologies encountered in this section comprised of calcilutite, calcarenite, sandstone siltstone and claystone.

The whole section was drilled quickly, at an overall average rate of 81.5m/hr, with drilling parameters optimised for maximum penetration. Penetration rates could possibly have been even higher, if it were not for significant drilling mud losses at surface, due to drilled sand "blinding" the shakers screens, which resulted in lower flow rates than were planned. The flow rate averaged 678 gpm and ranged from 412 - 987gpm while the weight-on-bit ranged from 0.3 to 17.2 tonnes.

From 565m to 732mBRT, calcilutite and calcarenite formations were encountered. A massive sandstone formation was encountered from 732 to 1015mBRT. Penetration rates averaged 140m/hr through this interval. Only trace amounts of gas were detected, flowline temperatures increased steadily with depth and no cavings were observed. In anticipation of possible geopressed formations, the mud weight was increased to 1.25sg by 1037mBRT. Interbedded siltstones, sandstones and minor claystones were drilled from 1015m to 1435mBRT, with the penetration rate averaging about 55m/hr. At 1435mBRT, a massive claystone formation was encountered, with penetration rates initially about 25m/hr. At 1475mBRT, the average penetration rate almost doubled, possibly indicating undercompaction. Resistivity data from the MWD tool showed a marked decrease from 1475 to 1575mBRT, from 2  $\Omega$ -m to about 1.2  $\Omega$ -m. Trace to less than 10% tabular cavings were first seen at this time. No splintery cavings were seen. The temperature gradient increased steadily with depth, suggesting a normal temperature conditions. Background gas remained at trace levels (<0.08% Total Gas). In the interval from 1575m to section TD at 1790mBRT, MWD resistivity data crept back above 2  $\Omega$ -m with all other pressure indicators remaining normal. While pulling the bit out of hole from 1790mBRT, tight spots were encountered, requiring backreaming for the interval 1413m - 932m. On the trip back to bottom, washing and reaming was needed from 1700m, with ten metres of fill encountered above bottom. A caustic hi-vis pill was pumped and the hole circulated until the shakers became clear of significant amounts of moderately large (up to 15mm size) blocky, tabular cavings from the wellbore.

In summary, no splintery pressure cavings in this hole section. Most of the formations in this section were normally pressured at 1.03 sg EMW. The production of small amounts of blocky and tabular cavings in the claystones drilled suggested tectonic stress-relief conditions in the wellbore, rather than abnormal geopressure. The mud system more than adequately inhibited any clay-mineral swelling to cause hole problems. Pore pressure probably increased from 1475m to 1575mBRT to an estimated maximum of about 1.10 sg EMW. Below this interval, maximum pore pressure fell back to about 1.05 sg EMW.

## 8.5" Hole Section

The drilling fluid for the 8.5" hole section was the same as the previous hole section, a KCl/PHPA/Glycol water-based system, initially weighted to 1.15sg. The section, composed of claystone, siltstone and sandstone, was drilled with a fixed cutter bit, once again making any corrected drilling exponent data inaccurate for pore pressure estimations. Claystones with a maximum estimated pore pressure of about 1.05 sg EMW from the previous hole section were drilled from 1790m to 1846mBRT. The equivalent circulating mud density (ECD) of 1.20 - 1.23sg while drilling provided more than adequate overbalance conditions for wellbore stability. Throughout the drilling of this section, there were no splintery cavings - only trace amounts of blocky to tabular cavings were observed. Apart from an isolated gas peak of 3.13% at 1888mBRT in a thin sandstone, background gas levels throughout remained low, averaging about 0.12%. The flowline temperature gradient increased steadily with depth from about 31.3°C at the casing shoe to 49.2°C at 2156mTD. MWD resistivity data did not indicate any anomalous intervals. The clean moderately well-sorted sandstones drilled indicated good porosities and permeabilities. While tripping the bit out from TD, the hole was found to be in good condition, with no hole problems encountered. With no significant hydrocarbon content, normal flowline temperature gradient and MWD resistivity data showing no anomalous intervals, the pore pressure in the lower part of the 8.5" hole from 1846m to 2156mBRT is estimated to have remained normal, with a gradient of 1.03 sg.

## 4.2 FRACTURE PRESSURE EVALUATION

Fracture pressure estimation for Geographe North-1 was made using the Baker Hughes INTEQ zero tensile strength method. For a full explanation of this method, refer to INTEQ Manual MS-156 "The Theory and Evaluation of Formation Pressures".

With no returns to surface it was not possible to estimate the fracture pressure through the 36 and 17.5" hole sections. Leak-Off Tests (LOT) were performed at the 13.375" and 9.625" casing shoes, with the results shown below:

Casing Depth	Casing Size		Hole Size		Test Mud Density	Test EMW	Test type
	in	mm	in	mm	(SG)	(SG)	
577.8	13.375	340	12.25	311	1.14	2.01	LOT
1797	9.625	244	8.5	216	1.15	1.85	LOT

### 12.25" Hole Section

A KCL/PHPA/Glycol (Aquadrill) water-based mud system with Penetrex and Alplex mud additives, weighed initially at 1.14sg, was used to drill the 12.25" hole section. The section was drilled fast with 412 to 987gpm flow rates limited only by the cuttings load capacity of the shakers. There were erratic losses at the surface and possible seepage losses to the coarser beds of the clastic formations encountered. The mud weight was incremented to 1.25 sg in anticipation of higher formation pressure in claystones below 1037m with no noticeable mud losses downhole. The maximum effective circulating mud density imposed against the formation while drilling was calculated at 1.27sg. The mud weight was further raised to 1.28sg prior to the 9.625" casing run with no loss to the formation.

### 8.5" Hole Section

As in the previous hole section, a KCI/PHPA/Glycol water-based mud system was used, with the mud weight cut back to 1.15 sg while drilling the 9.625" shoe track. The 8.5" section was then drilled to a total depth of 2156mBRT. The formations drilled consisted of massive claystones and towards the lower portion, massive sandstones with thin stringers of siltstones. There were no mud losses downhole while drilling. Several flow checks conducted at various points throughout the section particularly during drillbreaks showed no static losses downhole. The maximum effective circulating density (ECD) attained while drilling was 1.23 sg, well below the LOT result of 1.85 sg EMW. The wide margin between the ECD and LOT values and the absence of any tectonic or structural weakness in the formations encountered in this hole section ensured that pump pressures used while drilling never reached the theoretical fracture pressure limit.

## **Tables**

Table 1: Bit Run Summary

Tables

OPERATOR		WELLSIDE ENERGY LTD		WELL NAME		GEOGRAPHE NORTH-1		LOCATION		VIC/P43		CONTRACTOR		DIAMOND OFFSHORE GENERAL COMPANY		RIG		MODU OCEAN BOUNTY																										
BIT RUN	BIT No.	MAKE	TYPE	TFA sq.in.	JETS	SERIAL No.	DEPTH IN m	METRES ON BIT	HRS ON BOTTOM	AV ROP m/hr	IADC HRS	WOB Tonnes	RPM S/M	TBR krev	SPP psi	GPM	TQ	REASONS PULLED						MW	SG	REMARKS																		
																		BC - Broken Core	BT - Broken Teeth	BU - Balled Up	CC - Cracked Cone	CD - Core Dragged	CI - Core Interference				CR - Corod	CT - Chipped Teeth	FC - Flat Crested Wear	HC - Heat Checking	ID - Junk Damage	LD - Lost Cone	LN - Lost Nozzle	LT - Lost Teeth	OC - Off-Center Wear	PB - Punched Bit	PM - Plugged Nozzle	RG - Rounded Gauge	RO - Ring Out	SD - Spurred Damage	SS - Self Sharpening	TR - Trailing	WO - Washed-Out Bit	WT - Worn Teeth
36" HOLE SECTION 107 - 163.0mBRT																																												
1	RB1	Varel	L111A	4.712	Open	3546	107.0	56	3.2	17.5	3.8	0.4-4.6	87/-	16.8	116-1234	407-1102	.46-.88	not graded						1.03	36" hole TD																			
17.5" HOLE SECTION 163 - 565mBRT																																												
2	NB2	Varel	ETRIGJ	0.764	1x14,2x20	152878	163	402	9.3	43.2	12.3	0.4-12.4	125/-	69.9	606-3415	520-1190	1.2-4.61	1	1	WT	A	E	1	NO	TD	1.03	17.5" hole TD																	
12.25" HOLE SECTION 565 - 1790mBRT																																												
3	NB3	Smith	MA985	0.773	7 x 12	JS4096	565	1225	31.7	38.6	42.8	0.3-17.2	95/68	340.3	993-3104	412-987	1.3-12.0	2	4	BT	T	X	I	CT	TD	1.14-1.25	PDM, MWD																	
8.5" HOLE SECTION 1790 - 2156mBRT																																												
4	NB4	Smith	MA89PX	0.663	6 x 12	JS 6303	1790	366	11.3	32.4	16.3	1.4-12.7	140/-	94.1	771-3801	170-784	1.3-8.6	3	2	WT	N	X	I	CT	TD	1.15-1.16	MWD																	
TOTAL DEPTH (m)																		2156		mBRT																								

NOTE: Bit run number = BHA number ; NB = New Bit RB = Rerun Bit PDM = Downhole Motor



Woodside Energy Limited  
Geographe North-1

September - October 2001

Latitude:	<b>39° 04' 39.928" S</b>	Field Strength:	<b>1222.77 nT</b>
Longitude:	<b>142° 54' 57.844" E</b>	Grid Convergence:	<b>1.200 deg</b>
Section Azimuth:	<b>0.00 deg</b>	Total Azimuth Corr:	<b>-1.170 deg</b>
Dip:	<b>-70.26 deg</b>	North Reference:	<b>Grid North</b>
Declination:	<b>11.03 deg</b>	Computation Method:	<b>Minimum Curvature</b>

### Directional Survey Listing

MEASURED DEPTH (m)	INCLINATION ANGLE (deg)	AZIMUTH ANGLE (deg)	VERTICAL DEPTH (m)	LATITUDE +N/S- (m)	DEPARTURE +E/W- (m)	VERTICAL SECTION (m)	DOGLEG (deg/10 m)	Survey Type
561.00	0.50	0.00	561.00	0.00	0.00	0.00	0.00	TIP
582.93	0.14	140.00	582.93	0.08	0.02	0.08	0.28	MWD
787.44	0.24	327.54	787.44	0.25	-0.05	0.25	0.02	MWD
1045.27	1.06	176.39	1045.26	-1.68	-0.19	-1.68	0.05	MWD
1134.01	1.32	323.02	1133.99	-1.68	-0.75	-1.68	0.26	MWD
1221.07	1.31	340.49	1221.03	0.06	-1.69	0.06	0.05	MWD
1308.98	1.44	340.75	1308.91	2.05	-2.39	2.05	0.01	MWD
1395.89	1.46	335.28	1395.79	4.08	-3.21	4.08	0.02	MWD
1510.17	1.39	334.24	1510.04	6.65	-4.42	6.65	0.01	MWD
1568.32	1.65	336.38	1568.17	8.06	-5.07	8.06	0.05	MWD
1656.23	1.91	353.24	1656.04	10.67	-5.75	10.67	0.07	MWD
1713.58	1.95	1.23	1713.35	12.6	-5.84	12.6	0.05	MWD
1762.43	1.84	357.96	1762.18	14.21	-5.85	14.21	0.03	MWD
1810.16	1.94	4.62	1809.88	15.78	-5.81	15.78	0.05	MWD
1984.85	0.73	44.27	1984.52	19.53	-4.79	19.53	0.08	MWD
2142.68	0.66	64.11	157.83	20.64	-3.28	20.64	0.02	MWD

Table 4: Time vs Depth Curve

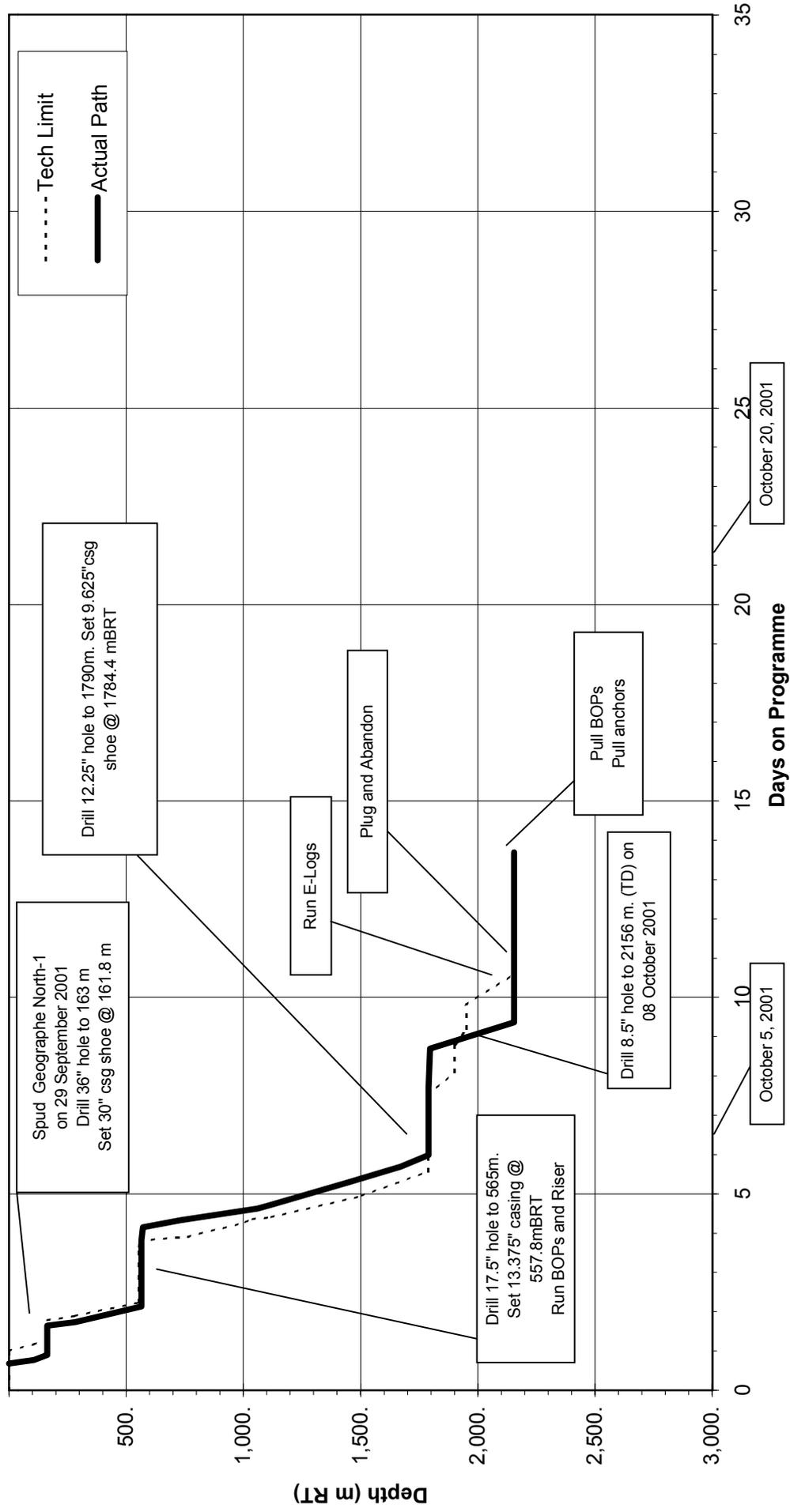


**Woodside Energy Ltd**  
**GEOGRAPHE NORTH-1**

Time vs. Depth Curve



INTEQ



## **Appendix**

# **Formation Evaluation Log**

1: 500

# **Drilling Data Plot**

1: 2500

# **Pressure Data Plot**

1: 2500

# **Pressure Summary Plot**

1: 7500

# Gas Ratio Analysis Plot

1: 500