3D OIL LIMITED

WARDIE 1

VIC/P57

WELL COMPLETION REPORT

BASIC DATA

1 December 20

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1. WELL SUMMARY AND OVERVIEW

Well summary

Wardie 1 was a deviated wildcat well located in the Gippsland Basin permit VIC/P57, approximately 1.2 km (surface location) southwest of the West Seahorse 1 (oil discovery well) and about 570m south of the West Seahorse 2 well. The Wardie Prospect was mapped as a four-way dip closure at the level of the upper Latrobe Group. The main objectives were Eocene sandstones (N2.3, N2.6 and P1), which were intersected in the nearby West Seahorse oil field. 3D Oil Ltd is the operator and 100% equity holder of offshore Victorian permit VIC/P57.

Wardie 1 was drilled from 10 May to 25 May 2008 using the Seadrill Jack-Up rig, *West Triton*. The well intersected all the target horizons approximately 15m deep to prognosis, indicating an unexpected variation in the velocity field used for depth conversion. Oil was encountered in sediments above the N1 reservoir target at 1591-1595mRT (1407.5-1411.5mss) within an interval of generally poor reservoir quality. Oil was also encountered in a shallower glauconitic sand at 1581-1584m MDRT (1397.5-1400.5mss) also within low reservoir quality sediments. The main N1 reservoir sands were water bearing as were all the deeper targets.

The well results indicate that the Wardie structure, although valid and oil-bearing, is smaller than mapped pre-drill. The potential recoverable oil volume in the Wardie structure was not considered to be sufficient to justify suspending the well and it was plugged and abandoned.

Australian Drilling Associates (ADA) managed the drilling operation and Baker Hughes INTEQ SLS provided formation evaluation and drill monitoring services. Schlumberger provided the LWD and Wireline services. Expro Group Australia Pty Ltd provided validation checks and analyses of MDT samples.

Notes: All depths are measured depth below Rotary Table (mMDRT) referenced to Australian Height Datum (AHD) unless otherwise stated.

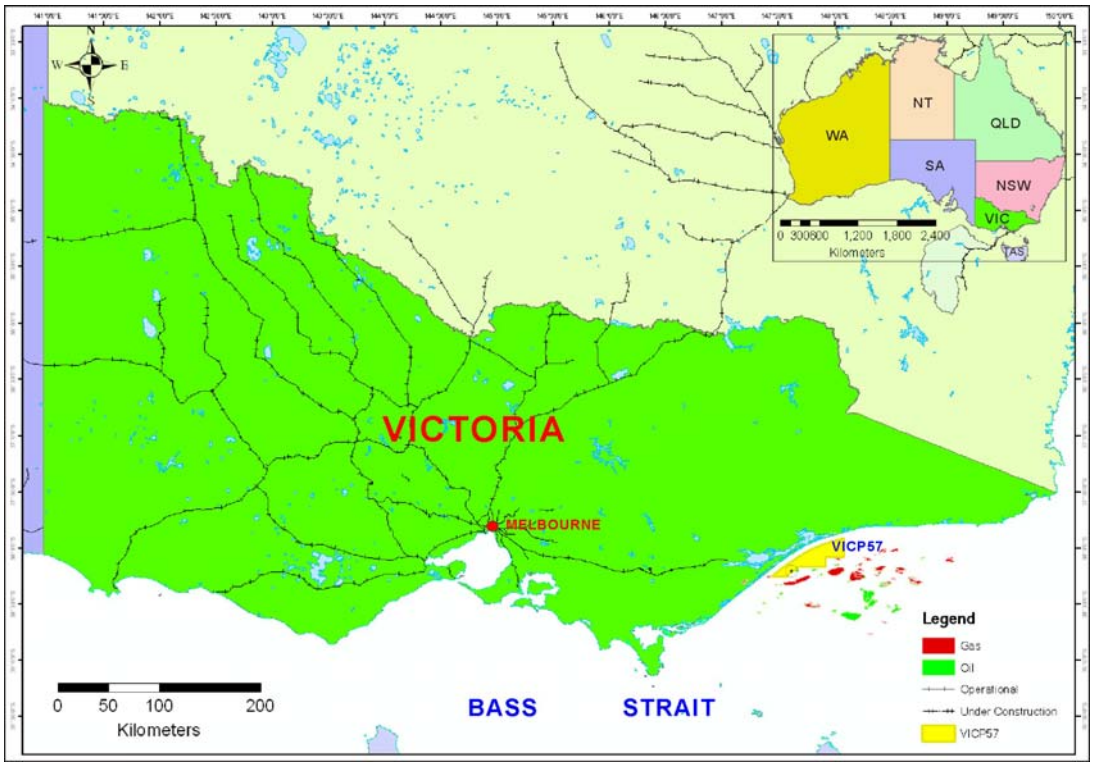


Figure 1. Location of VIC/P57.

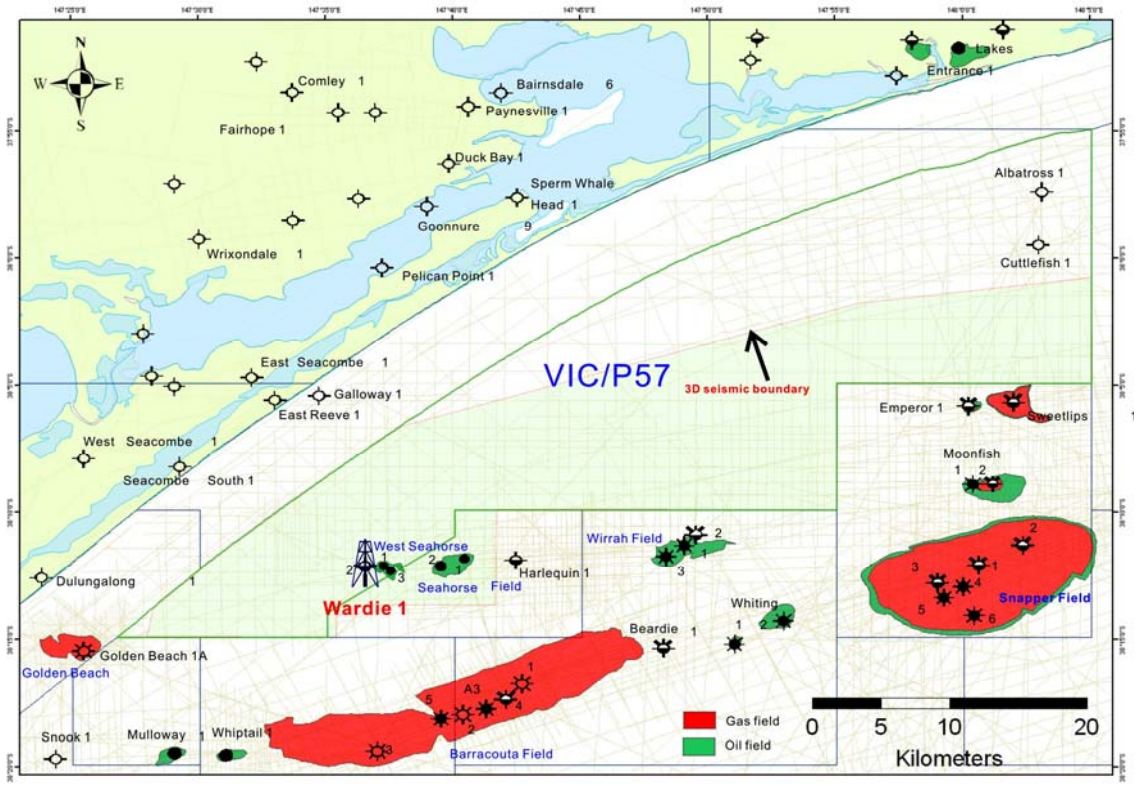


Figure 2. Location of the Wardie 1 well.

Well data summary

Well Name	Wardie-1
Country	Australia
Designation	Exploration
Field Name	Wardie Prospect
License/Permit	VIC / P57
Rig Name/Type	West Triton / Jack Up MODU
Field Operator	3D Oil Ltd
Participants	3D Oil Ltd: 100%
Rig on Location	9th May, 2008 - 16:30 hrs
Spud Date	10th May, 2008 - 19:30hrs
Reached TD	18th May, 2008 - 15:30 hrs
Rig Off Contract	25th May, 2008 - 22:30 hrs
Total Days on Operations	16.25 days
Total Days AFE (excluding Completions and Testing Phase)	14.67 days
Total Depth	1580.2m TVDSS / 1618.2m TVDRT / 1766.0mMDRT
Well Type	Directional 'S' profile
Maximum Deviation Angle	34.9˚
Water Depth	39.5m MSL
RT above MSL	38m
Well Slot	2
Zone	55 GDA94
Surface Latitude	38˚ 12' 24.881'' S
Surface Longitude	147˚ 37' 09.793'' E
Surface Easting	554 227.625m E
Surface Northing	5 771 046.028m N
Bottom Hole Location: Latitude	38˚ 12' 34.440" S
Bottom Hole Location: Longitude	147˚ 36' 48.166" E
Bottom Hole Location: Easting	553 699.70m E
Bottom Hole Location: Northing	5 770 754.92m N
36in Hole / 30in x 20in Conductor	136mMDRT / 133mMDRT
17.5in Hole / 13.375in Surface Casing	751.0mMDRT / 747.2mMDRT
12.25in Hole	1766.0mMDRT / 1618.2mTVDRT

Casing and cementing data

Casing Data

Type	Size (inches)	Weight (ppf)	Grade	Thread	Depth (mMDRT)
Conductor (30in x 20in tapered shoe joint)	30	309.7 (1" wall)	X-52	D60/MT	121.3
	20	169 (0.625" wall)	X-56	E.R.W	132.9
Surface Casing	13.375	68	N-80	BTC	747.2

Cementing Data

String Cemented	Cement Type	Dry Cmt Vol (sks)	Cement Additives	Mix Water (gal/sk)	Slurry Vol (bbls)	Slurry Density (ppg)	Cement to / from (mMDRT)	Csg Test Pressure (psi)
30in X 20in	Class G	1454	CaCl 1% BWOC NF-6: 0.25gal/10bbl	5.16	265	15.9	seafloor (77.5m) - 133.0m	NA
13.375in	Class G	726	CFR-3L: 3gal/10bbl HR-6L: 2gal/10bbl NF-6: 0.25gal/10bbl	5.10	150	15.9	432m-747m	2,000
Plug #1A	Class G	411	CFR-3L: 3gal/10bbl SCR-100L: 2gal/10bbl NF-6: 0.25gal/10bbl	4.70	85	15.8	1616m-1766m	NA
Plug #1B	Class G	320	CFR-3L: 3gal/10bbl SCR-100L: 2gal/10bbl NF-6: 0.25gal/10bbl	4.70	64	15.8	1513m-1616m (tagged at 1407m)	NA
Plug #2	Class G	290	CFR-3L: 3gal/10bbl SCR-100L: 2gal/10bbl NF-6: 0.25gal/10bbl	4.70	58	15.9	700m-805m	
Plug #3	Class G	19MT	CaCl 0.5% BWOC	5.16	93	15.9	95m-157m	

2 WELL OPERATIONS

Operations summary

Wardie-1 was drilled as an exploration well intended to target sandstones of the upper Latrobe Group in the Wardie structure using the Jack Up rig, *West Triton* (Figure 3).

Figure 3. Aerial photo-view of the West Triton.

Rig Mobilisation

The rig was already on location having previously drilled the West Seahorse-3 well from slot #1. Wardie-1 well (slot #2) commenced on 9 May 2008 at 16:30hrs with the installation of the CTU deck extension. Service lines were connected and the cement hose on the rig floor was changed out. A fault was traced in the ROV umbilical line and rectified costing 0.4 days (ROV fault affected temporary P&A operations being completed on West Seahorse-3). During this time 12 joints of heavy weight drill pipe (HWDP) were laid out for inspection and 12 new joints were picked up. Two stands of 5.5in drill pipe were also laid out while waiting on the ROV. The rig was then skidded over to slot #2, the CTU was installed onto the CTU deck extension and the CTU work platform and mouse hole placed in position.

ROV problems occurred just after abandoning West Seahorse-3 and it was thought repairs could be made offline during skidding operations to Wardie-1. However fault tracing on the ROV umbilical and repairs took more time than expected and caused 10 hours down time into Wardie-1 operations.

Drilling 36in x 26in conductor hole/setting 30in x 20in casing

The BHA, consisting of a 26in bit, 36in hole opener, Anderdrift tool, float sub and 36in stabilizer was RIH and bottom tagged at 76.8m due to a mound of cement being present. The bit position was checked relative to the West Seahorse-3 well and found to be approximately 3m from the West Seahorse-3 conductor casing. The ROV was stood back and a deviation survey was taken at the seabed (<0.5 deg) using the Anderdrift tool.

Wardie-1 was spudded on 10 May 2008 at 19:30hrs.The 36in x 26in conductor hole was drilled riser-less using seawater and hi-vis sweeps, pumping 75bbl of flocculated gel sweeps every single while drilling from 76.8m to a section TD of 136m. Anderdrift surveys were taken while drilling at 87m (2˚) and 134m (1˚). The hole was swept with 200bbl of flocculated gel mud and displaced with 350bbl pre-hydrated gel. The 36in BHA was POOH and laid down.

The 30in conductor was run with a 30” x 20” shoe joint to 74m (~ 1.5m above the Quik-Jay connector at seabed on West Seahorse-3).

The ROV was unable to sight the West Seahorse 3 conductor or the seabed due to turbulent currents and gel clouds in the proximity. Seawater was pumped at 400gpm in an attempt to clear the area around the seabed but there was no improvement. After waiting for visibility to improve at slack tide, the conductor was observed to be approximately 3m offset from West Seahorse-3 in the correct position. The conductor was lowered to the seabed and worked past the cuttings mound after several attempts. The conductor hung up on a connector at a depth of 85m on the aft side of the CTU. Attempts were made to pull the conductor forward using the air winch on the rig floor without success. The cantilever was then skidded 6in forward allowing the connecter to pass the hang up point and was RIH from 85m to 130m. The conductor was washed down from 130m to 133m to the programmed setting depth for the MLS joint to be 3m above the seabed. At this point landing ring inserts were installed at the CTU. Approximately two hours were taken to grind down weld protrusion on the 30in conductor for the Icon clamp. After the CTU was stroked to 100mm and the Icon clamp installed, the bolt-tensioning unit for the Icon clamp was found to be leaking hydraulic fluid and was repaired. The rig was then skidded 6in aft to centralise back over the Wardie-1 slot.

The 30in conductor was successfully cemented with 265bbls of 15.9ppg cement slurry with TOC at the mud line. The butt-weld landing collar was tagged at 85.40m. Once the space out of the low pressure riser and the diverter system was confirmed, the 30in conductor was cut at 0.3m above the Icon clamp on the CTU deck.

Drilling 17.5in surface hole/setting 13.375in casing

The 17.5in mud motor assembly was made up with a Baker Hughes MXL-T1V roller cone rock bit and MWD directional tools. The top of the shoe was tagged at 132.8m. The shoe was drilled out and drilling continued to 170m using seawater and pumping 2 sweeps of 30bbl flocculated gel mud per stand and spotting 30bbl of pre-hydrated gel on bottom at each connection. A gyro survey was taken at this depth and confirmed that there was no risk of colliding with West Seahorse-3. Continued to drill to the kick off depth at 250m. The 17.5in surface hole was directionally drilled in one

run without problems to a section TD of 751m. At section TD, 950bbl of 1.15SG inhibited mud was spotted on bottom. An over pull of 20klbs was observed at the 30in shoe when POOH. This was cleared by circulation and rotation before POOH to surface.

The 13.375in casing was RIH to 113m but it hung up on the MLS at the mud line. The rig was then skidded 6 inches forward to allow the casing to pass the MLS. A hydraulic hose burst on the skidding system and the hose was replaced costing 2 hours NPT. The 13.375in casing was then RIH hanging up at several places from 124m to 166m. The casing string was POOH and the centralisers and stop rings removed (costing 9 hours NPT). The casing was then re-run slick to 722m without problems, and the mud line hanger landed. The casing shoe was set at 747.2m.

Cement lines were pressure tested to 4000psi and a 90bbls seawater spacer pumped followed by 30bbls of tuned spacer. The 13.375in casing was cemented with 150bbls of 15.9ppg Class G slurry. Cement was displaced with 337bbls of seawater and the plug bumped. The casing could not be pressure tested on bump due to a leak in the wellhead running tool.

A failed attempt to release the running tool from wellhead was made. The top drive was then made up and 4klbs set down to fully collapse the running tool allowing the running tool to be backed out. The BOP and diverter system were then nippled up. The BOP was tested to 250/5000psi. The 13.375in casing was also pressure tested to 250/2000psi. The total NPT for this phase was 0.73 days.

Drilling 12.25in hole/logging while drilling

A 12.25in Power Drive rotary steerable BHA was made up with a Reed Hycalog RSX616M-A16 PDC bit. The assembly was RIH to 703m and after making up the TDS was washed down, reaming through a thin cement stringer at 719m and cement tagged at 732.5m (approx 2m above float collar). The plugs, float collar and shoe track were drilled out to 747m.The rat hole was cleaned out to 751m and hole displaced to 8.8ppg KCl polymer mud while drilling out float shoe.

After drilling 3m of new formation to 754m, a FIT was performed at 520psi surface pressure with 8.8ppg mud to 13.1ppg EMW without leak off. The 12.25in hole was then directionally drilled from 754m to 1397m when the driller's cyber chair system shut down due to software problems. The problem was rectified and drilling continued to 1520m. Control drilling commenced from 1520m to the well TD of 1766m at 30m/hr for recording LWD logs. At TD the hole was circulated clean and the shaker screens were initially blinded by fine sticky cuttings, so the pump rate was reduced to 815gpm for first bottoms up then gradually increased to 1080gpm for the remainder of the circulation period.

The drill string was then POOH from 1766m to 1178m working tight spots at 1540m to 1530m, 1283 to 1273m and 1253m to 1178m. The string was then pumped out of hole from 1178m to 919m. The hole packed off at 919m with 30klb over pull. The string was worked until circulation was regained and pumped out to 747m. The hole was circulated clean inside the casing shoe. The string was RIH and 8m fill tagged on bottom. A large quantity of fines and small cuttings/cavings were circulated out. The cavings were identified as originating from lower Lakes Entrance Formation. The hole was circulated clean and the drill string POOH.

Logging 12.25in Hole

Schlumberger wire line tools were then rigged up for the following logs:

Log #1 PEX-HRLA-BHC

Log #2 MDT (pressures and sampling)

The tools for Log #1 were picked up, radioactive sources loaded and RIH. The 12.25in open hole was logged down from 747m to 1700m. The logging tools were then pulled back and a repeat section acquired for the interval from 1675m - 1565m. The wire line was then RIH back down to 1760m (max depth achieved by wire line). It was then attempted unsuccessfully to work past 1760m. Logging of the main pass continued back up the interval from 1760m - 1300m with a caliper log taken up to the casing shoe. Log #1 tools were then POOH and rigged down.

The tools for Log #2: MDT - GR were then picked up and RIH. A total of 17 pre-tests were attempted between 1574m and 1681.5m resulting in 9 valid pressures, 4 super charged points, 3 tight tests and 1 seal failure. Samples were taken at 1582.4m (x2) and 1593.7 (x1). Log #2 tools were then POOH to surface where the samples were recovered and the MDT tools were then rigged down.

Well abandonment

This phase of the programme commenced with RIH of the mule shoe on 5.5in drill pipe to 1765m where the well was circulated bottoms up. Cement head and lines were rigged up, 10 bbls of drill water was pumped and the lines were pressure tested to 1000psi. Abandonment plug #1A was then set from 1776m to 1616m with 85bbls of 15.80ppg Class G cement slurry (caliper volume plus 10% excess). The cement was displaced with 2 bbls drill water followed by 98 bbls of mud. The string was POOH to 1613m.

The well was then circulated 1.5 times bottoms up and 170 bbls of contaminated mud was dumped prior to rigging up cement head and lines again. 10 bbls of drill water was pumped and the lines were pressure tested to 1000psi. Abandonment plug #1B was then set from 1616m to 1513m with 64bbls of 15.80ppg Class G cement slurry (caliper volume plus 20% excess). The cement was displaced with 2 bbls drill water followed by 90 bbls of mud. The string was POOH to 1406m.

The well was then circulated 1.5 times bottoms up and 170 bbls of contaminated mud was dumped. The link tilt clamps on the bails were adjusted to allow the elevators to reach the mouse hole and then excess pipe was laid down while waiting on cement. The string was then RIH, washing down from 1398m to 1407m. The top of plug #1B was tagged at 1407m with 5klb set down weight.

The string was then POOH to 903m and a 50 bbls high vis pill spotted before the string was pulled out to 805m. After rigging up the cement head and lines, 10 bbls of drill water was pumped and the lines were pressure tested to 1000psi. Abandonment plug #2 was then set from 805m to 700m with 58bbls of 15.80ppg Class G cement slurry. The cement was displaced with 2 bbls drill water followed by 37 bbls of mud. The string was POOH to 599m. The well was then circulated 1.5 times bottoms up

with no cement returns observed. The string was POOH laying out 45 singles of 5.5in drill pipe.

Cement plug #2 was tested to 1000 psi for 10 minutes. The diverter system and BOPs were nippled down. The flow line was removed in preparation to skid the rig and the wear bushing was retrieved. The 13.375in casing cutter was picked up and casing cut at 126m and the cutting tool laid down. The wellhead running tool was made up to the wellhead and the 13.375in landing string including the wellhead was POOH to surface and laid down. A cement stinger was RIH to 207m and 25bbls of hi vis was spotted before POOH to 157m. The cement head and lines were rigged up, 5 bbls of sea water was pumped and the lines were pressure tested to 500psi. Abandonment plug #3 was then set from 157m to 95m with 93bbls of 15.80ppg Class G cement slurry. The cement was displaced with 6 bbls of sea water before rigging down the cement lines and POOH to 95m and circulating the hole clean. The cement string was then POOH to surface and rigged down.

Three attempts were made to cut the 30" conductor at 78m MDRT. Although there were positive indications of the conductor being cut on the second and third attempts, the conductor could not be pulled free. Failure to cut the 30in conductor resulted in 0.35 days lost time. The 30" landing string was backed out at the Quik-Jay connector at 74.5m (3m above seabed). The released casing was then pulled to surface and laid out. The 30in handling equipment was rigged down and the CTU unit was moved from CTU deck to storage area.

Rig demobilisation

The CTU deck extension was removed and lowered onto the work boat. All tubulars were laid down from the derrick. The cantilever was skidded in and secured in stowed position. The main towing bridle was attached to the Pacific Battler. The rig was jacked down to 2m draft. Water tight integrity checks were carried out while attaching secondary tow lines to the Pacific Valkyrie and the Sirius Cove vessels. The rig then continued to be jacked down into the water, lifting the legs clear from the seabed and the tow commenced to Garfish location.

****** 22:30hrs, 17 May 2008: END OF WELL: WARDIE-1******

The total time spent on the well was 16.25 days, including mob/demobilisation.

Health, safety & environmental summary

Wardie-1 was drilled with a satisfactory HSE performance having incurred no lost-time, with only one incidence of a medical treatment case and one minor first aid incident recorded. Two near-miss incidents took place, the risks of which were minimised with the use of good planning and foresight, covering the hazards with the crew during Pre Tour meetings prior to commencing the jobs and heightening awareness of the correct procedures to follow. One property damage incident occurred when skidding in the rig due to the locking pins not being retracted, resulting in damage to supporting steelwork.

The following is an overview of incidents, tests, and drills etc, which were evaluated and conducted during the time on Waride-1:

Parameter	Units		Comment(s)
Man-hours	number	16908	
STOP Cards Generated	number	362	
Total MODU Proactive Safety Efforts	number	831	Including Issued / Active Work Permits, JSA, Work Instructions, Pre Job safety Mtgs, TOFS, Area Authority Audits & STOP
Audit			
Internal EP Compliance Audit	number	0	
MODU Mini HSE Audits	number	2	TBT / TOFS & Lifting Equipment Management By the Drilling HSE Advisors
Training			
ADA ERG Exercise	number	0	Emergency Response table top exercise Southern Stars for 3D Oil held earlier on 2nd May 08. (Conducted on West Seahorse-3)
Environmental Plan Training	number	0	
MODU Emergency Drill	number	4	1) 3 Fire / Abandon / Muster (Weekly) Drills held on 12th, 18th and 25th May 08 2) 1 Medical Drill held on 12th May 08
Reportable Incident (NOPSA)			
Lost Time Injury (LTI)	number	0	
Alternate Duties Injury (ADI)	number	0	
Medical Treatment Injury (MTI)	number	1	12th May 08 - Swollen knee due to contact with casing joint
Non Reportable Incident (NOPSA)			
First Aid Case	number	1	2/5/08 - IP had laceration and bruise on rt wrist when removing a lifting nubbin.
Near Miss	number	2	1) 14/5/08 - Hydraulic fluid leak into bunded area 2) 20/5/08 - Fuel sprayed back into crew face when refuelling generator for wire line unit (full PPE in place).
Property Damage	number	1	Locking pins not retracted resulting in damage to supporting steelwork.
Recordable incidents (DPI)			
Spills – occurrence	number	0	

Parameter	Units		Comment(s)
Spills – quantity	litre	0	
Wastes			
Hazardous wastes	m^3	1	All wastes are properly packed, stored and sent onshore to GML and disposed accordingly through Corio Waste Management, an EPA - approved permit holder to transport various wastes including waste from offshore
Non-hazardous wastes	m^3	57	
Marine User Interaction			
Cetacean sightings	number	2	Sighting reports on 24th & 25th May '08, sent to Dept of Environment & Heritage
Errant vessel interaction	number	0	
Impacts from Fishing Operations (interaction)	number	0	
Water Based Muds (WBM)			
Volume water based drilling fluid disposed into the ocean (m^3)	m^3	790	Reference made to the Well Environment report
Volume of drill cuttings using WBM disposed to the seabed (m^3)	m^3	251.9	Reference made to the Well Environment report
Oil / Chemical Spills discharged to the marine environment	bbl	0	Reference made to the Well Environment report
Problems with sewage plant resulted in discharge of untreated sewage to the marine environment	number	0	Reference made to the Well Environment report

Highlights

- No major HSE incident
- No spill or damage to environment
- Well completed within planned budget
- All geological drilling targets achieved
- Acquired all programmed LWD and wire line log data
- Successfully modified and installed the Conductor Tensioner Unit extension platform allowing West Seahorse-3 and Wardie-1 wells to be drilled from a common surface location, saving significant time and cost by eliminating a rig move
- Based on the trouble free logging on West Seahorse-3 it was envisaged that the 12.25in open hole interval could be increased on Wardie-1. The 13.375in casing was therefore set at a shallow depth compared to West Seahorse-3 (785m v/s 1117m MDRT), resulting in 0.25 days rig time savings as well as reduced material costs.
- Deployed high spec rotary steerable system successfully, saving about half a day of rig time and improving wellbore quality
- Timely hiring of a third workboat (Pacific Protector) allowed rig down and demobilisation operations to be accelerated by 1.5 days

Lowlights

- 13.375inch casing had to be pulled and re-run without centralisers due to the centralizers hanging up in the MLS whilst running the casing.
- The 30inch conductor could not be cut during abandonment (this was subsequently backed off above seabed at the Quik-Jay connector).
- Continuing problems with Drilquip running tool
- There were numerous issues with drilling equipment (notably the TDS and cyber chair) towards the end of well.
- After landing out the 13 3/8inch casing and wellhead, 3.5 hours NPT was recorded due to problems releasing the running tool from the wellhead.

3. TIME ANALYSIS

Summary

The total time on Wardie-1 well was 16.25 days, compared to the programmed time (normalised for the actual scope of work) of 14.67 days. The planned time did not include any contingency for down times or waiting on weather.

The original well AFE time was 24.20 days. The original time was normalised to reflect the actual work scope, as below:

- Cancellation of the 9.625in casing operations (reduction of 1.92 days)
- Cancellation of well testing (reduction of 7.60 days)

Therefore the actual time on location was 1.58 days over the AFE planned time (i.e. ignoring the casing and testing phases).

Total Non-Productive Time (NPT) amounted to 2.61 days for Wardie-1.

- 24.14% of all NPT occurred during the plug and abandonment phase (costing 0.63 days)
- 22.99% of all NPT occurred during the setting of the 13 3/8” casing (costing 0.60 days).
- 22.22% of all NPT occurred during the setting of the 30” conductor casing (costing 0.58 days).
- 16.09% of all NPT occurred during the mobilisation (costing 0.42days).
- 9.58% of all NPT was incurred during the drilling of the 12.25in hole (costing 0.25days)
- 4.98% of all NPT was incurred while rigging down and moving out (costing 0.13days)

In total 16.06% of the time on well was incurred as non-productive time.

Time reconciliation by well phase

OPERATION PHASE	Planned Time (days)	Actual Time (days)	Total NPT			Rig Repair			WOW			Delta
			Days	% of Total Actual Time	% of Total NPT Time	days	% of Total Actual Time	% of Total Rig Repair Time	days	% of Total Actual Time	% of Total WOW Time	
Mob & rig up	0.33	0.96	0.42	2.58%	16.09%	0.00	0.00%	0.00%	0.00	0.00%	0.00%	+0.63
Drill 36" conductor hole	0.46	0.50	0.00	0.00%	0.00%	0.00	0.00%	0.00%	0.00	0.00%	0.00%	+0.04
Set 30" conductor	1.06	1.81	0.58	3.57%	22.22%	0.00	0.00%	0.00%	0.00	0.00%	0.00%	+0.75
Drill 17.5" hole	1.64	0.98	0.00	0.00%	0.00%	0.00	0.00%	0.00%	0.00	0.00%	0.00%	-0.66
Set 13.375" casing	2.11	3.23	0.60	3.69%	22.99%	0.00	0.00%	0.00%	0.00	0.00%	0.00%	+1.12
Drill 12.25" hole	2.69	2.85	0.25	1.54%	9.58%	0.08	0.49%	17.39%	0.00	0.00%	0.00%	+0.16
Log 12.25" hole	1.75	0.83	0.00	0.00%	0.00%	0.00	0.00%	0.00%	0.00	0.00%	0.00%	-0.92
P&A	2.13	3.44	0.63	3.88%	24.14%	0.25	1.54%	54.35%	0.00	0.00%	0.00%	+1.31
Rig down & move out	2.50	1.65	0.13	0.80%	4.98%	0.13	0.80%	28.26%	0.00	0.00%	0.00%	-0.85
TOTALS	**14.67**	**16.25**	**2.61**	**16.06%**	**100.00%**	**0.46**	**2.83%**	**100.00%**	**0.00**	**0.00%**	**0.00%**	**+1.58**

Time breakdown

Operation Phase	Time (days)					
	Planned	Actual	Programmed	Unprogrammed	NPT Programmed	NPT Unprogrammed
Mob & rig up	0.33	0.96	0.96	0.00	0.42	0.00
Drill 36" conductor hole	0.46	0.50	0.50	0.00	0.00	0.00
Set 30" conductor	1.06	1.81	1.81	0.00	0.58	0.00
Drill 17.5" hole	1.64	0.98	0.98	0.00	0.00	0.00
Set 13.375" casing	2.11	3.23	3.23	0.00	0.60	0.00
Drill 12.25" hole	2.69	2.85	2.85	0.00	0.25	0.00
Log 12.25" hole	1.75	0.83	0.83	0.00	0.00	0.00
P&A	2.13	3.44	3.44	0.00	0.63	0.00
Rig down & move out	2.50	1.65	1.65	0.00	0.13	0.00
TOTALS	**14.67**	**16.25**	**16.25**	**0**	**2.61**	**0**

Time Depth Curve

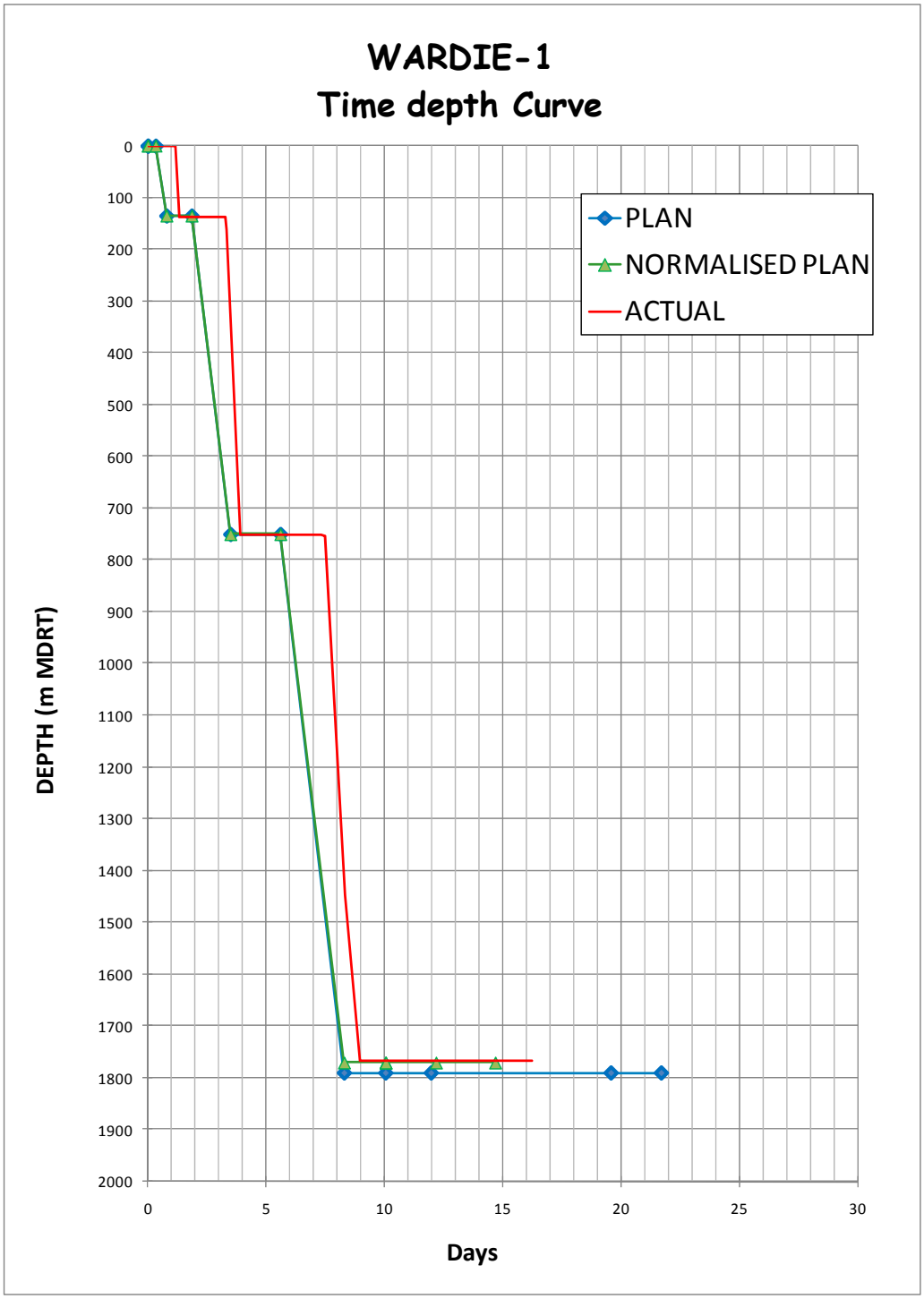
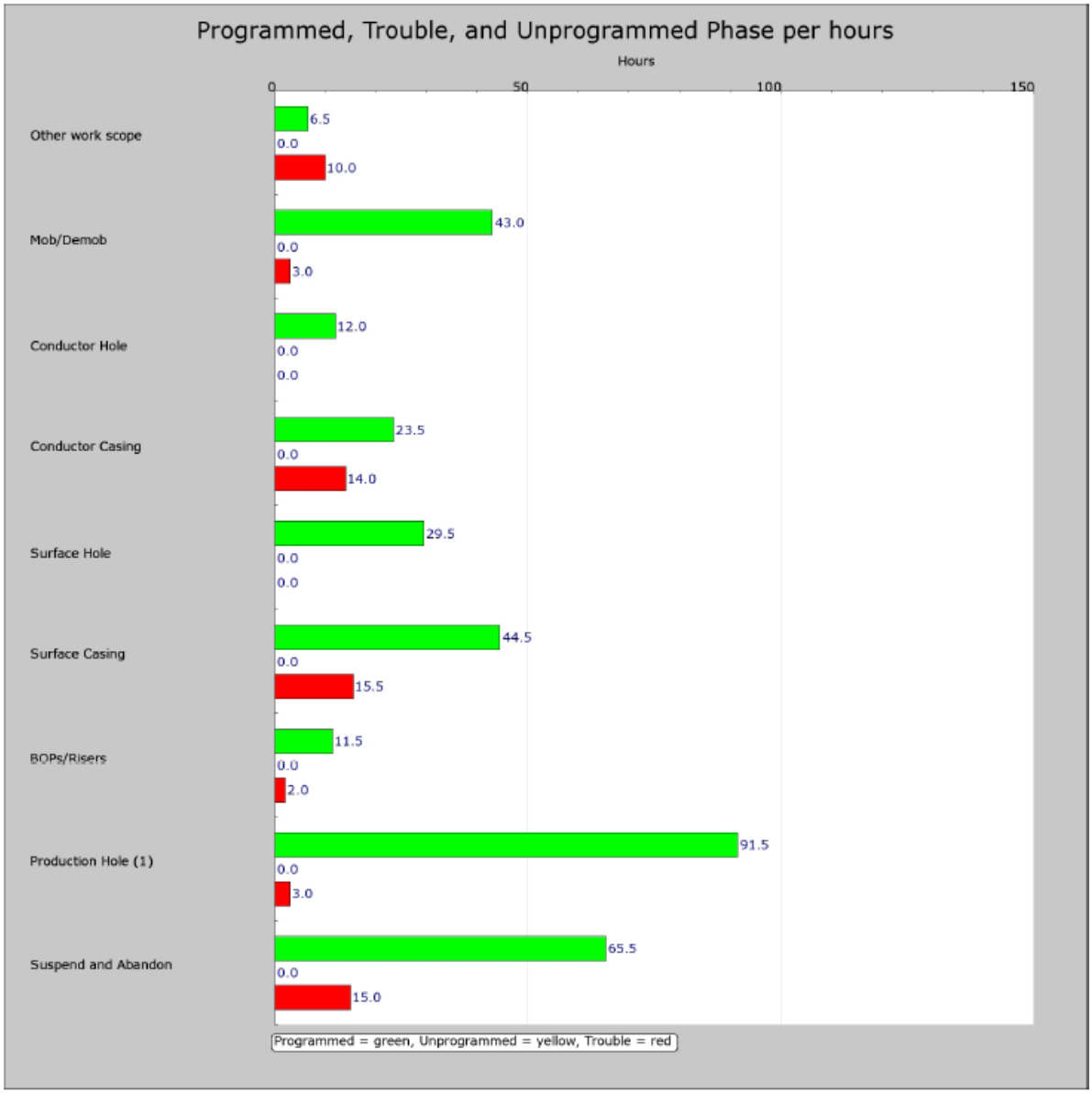


Figure 4. Time depth curve.

Programme, Trouble and Un-programmed by Phase

Time Breakdown by Phase



Total Time on Operations : 390 hrs

Total Productive Time : 327.5 hrs

Total Lost Time : 62.5 hrs

Total Unprogrammed Time : 0 hrs

Figure 5. Programme, Trouble and Un-programmed by Phase.

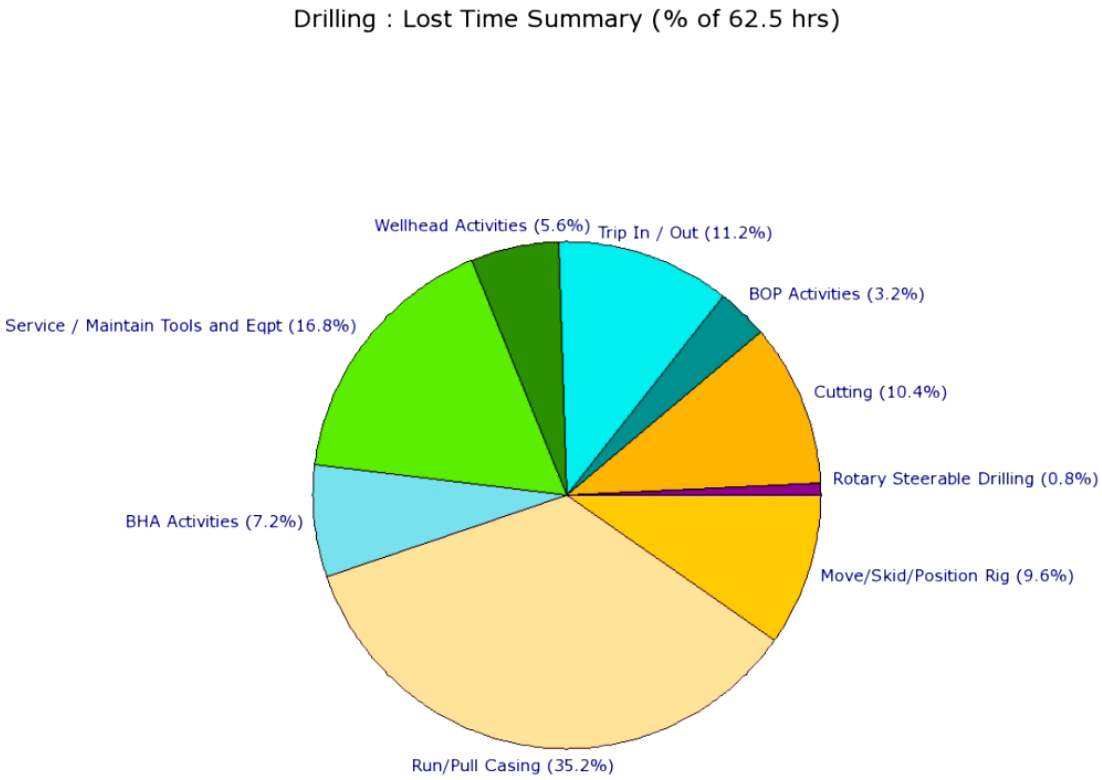
Non-productive time analysis

Phase (in sequence)	NPT (days)	NPT by Cause								
		WOW	Hole Condition		Rig Equipment		Third Party		Other	
Mob & rig up	0.42						0.42	Fault in ROV umbilical. Fault repaired.		
Drill 36" conductor hole	0.00									
Set 30" conductor	0.58		0.06	Conductor casing hung up on side aft side of CTU.			0.10	Troubleshoot bolt tensioning unit for Icon clamp.	0.04	No visibility with ROV due to current and gel clouds.
			0.04	Skidded cantilever 6in forward.			0.08	Re-install Icon clamp and tension up same.	0.04	Waited on improved visibility.
			0.04	Once casing run - skidded cantilever back to re-centralise over Wardie 1 slot.			0.08	Grinding weld to fit iron clamp. The weld on the 30" conductor required grinding to allow installation of the Icon clamp.	0.04	Attempted to work conductor casing into hole. Conductor appeared to be slightly port of centre.
									0.04	Circulated and worked casing past hang-up point and into hole.
Drill 17.5" hole										
Set 13.375" casing	0.60		0.08	Seal on skidding system hydraulic hose burst. Hose replaced.			0.06	Failed attempt to release running tool from wellhead.		

Phase (in sequence)	NPT (days)	NPT by Cause								
		WOW	Hole Condition		Rig Equipment		Third Party		Other	
			0.31	Unable to work 13.375in casing past 166m. POOH to shoe track laying out 13.375in casing.			0.08	Made up top drive and applied 4klbs on running tool - tool fully collapsed. Backed out running tool with rig tongs.		
			0.04	Cut centralisers and stop collars from the shoe track						
			0.02	Cut joint # 75 above collar joint and laid out same. Backed out and loaded out float collar joint. Casing re-RIH without centralisers.						
Drill 12.25" hole	0.25				0.08	Leaks of 60psi/min occurred during IBOP test. Function and greased manifold valves to rectify problem.				
					0.04	Investigate problem with TDS. Rest PLC and reboot system.				

Phase (in sequence)	NPT (days)	NPT by Cause								
		WOW	Hole Condition		Rig Equipment		Third Party		Other	
					0.02	Driller's cyber chair system shut down, was able to able to circulate but not rotate or reciprocate. Investigated and rectified - software related problem.				
					0.11	Failed attempt to open trip tank line for flow check - valve on trip tank return line seized.				
Log 12.25" hole	0.00									
P&A	0.63				0.04	Top drive hydraulic inoperable - lost time racking back first stand of drill pipe.				
					0.08	Drillers display locked up - trouble shot and rebooted system.	0.38	First attempt to cut 30in conductor failed. Two more unsuccessful attempts were made after replacing cutting knives		
					0.13	Drillers display locked up - trouble shot and rebooted system.				

Phase (in sequence)	NPT (days)	NPT by Cause									
		WOW	Hole Condition		Rig Equipment		Third Party		Other		
Rig down & move out	0.13				0.13	Attempted to skid out rig package - lock pin left in extended position. Cut off lock pin assembly on port and starboard sides of the cantilever. Major damage to locking pins and associated steel work.					
TOTALS	2.61	0.00	0.37		0.49		0.46		0.16		
Percentage of NPT	100.0%	0.0%	14.18%		18.77%		17.62%		6.13%		
Percentage of Total Well Time	16.06%	0.0%	2.27%		3.02%		2.83%		0.98%		



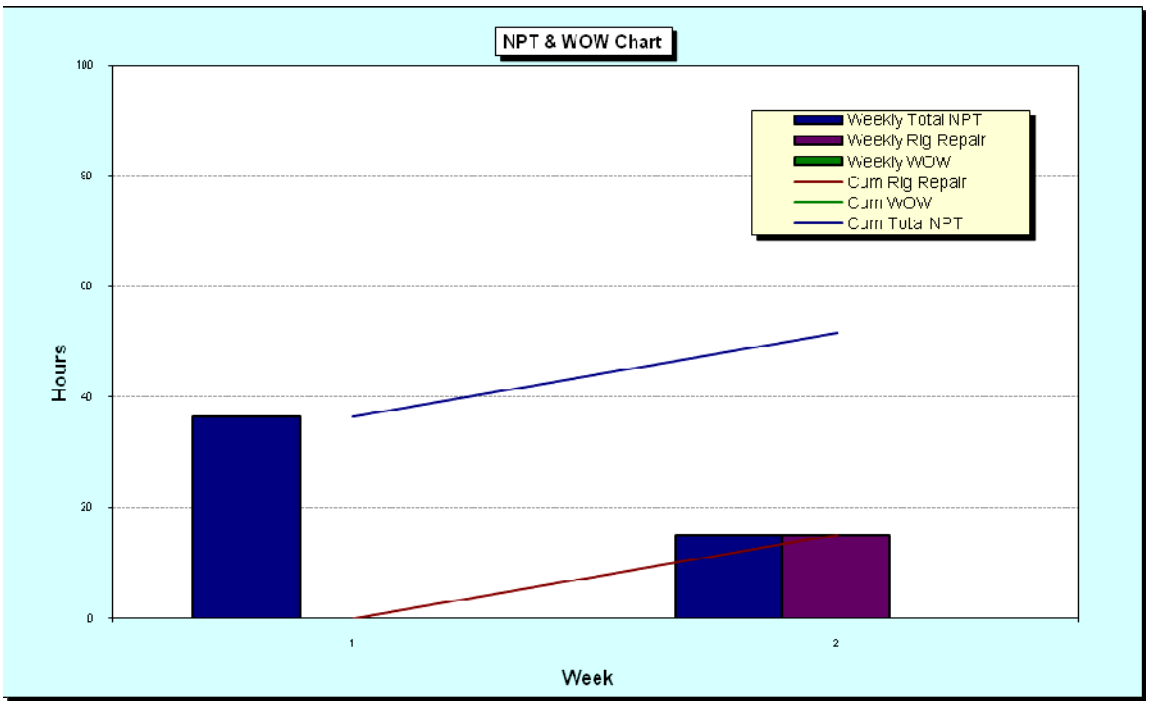


Figure 6. Lost time summary during drilling period.

Mobilisation and drilling phases

Observations by Phase		Comments / Corrective Action Taken or Proposed
Mob & rig up		
Drill 36" conductor hole		
Set 30" conductor	• Grinding the weld seam took 2 hours of rig time so that the Icon clamp could fit onto the 30" conductor.	• Grinding the weld on the conductor should have been done prior to sending to the rig saving rig time.
Drill 17.5" hole	Good bit performance	Hughes MXL-1V bit suitable for Gippsland Limestone formation.
Set 13.375" casing	• Casing held up on centralisers • No centralisers damaged or lost when pulling casing	• Avoid sharp change in inclination when spudding; Use minimum possible centralisation; Install stop collars at recommended distance from centralisers • Halliburton supplied Centek centralisers were used and are recommended in future
Drill 12.25" hole	Good bit performance	Reed PDC RSX-616 performed well and is recommended for use through Latrobe sands.
Log 12.25" hole		
Abandon & demob		

4. DRILLING & ENGINEERING SUMMARY

Drilling summary report

The primary objectives of the Wardie-1 exploration well were Eocene sandstones of the upper Latrobe Group, in particular the N2.3, N2.6 and P1 sandstone reservoirs. These intervals were intersected in West Seahorse-1 (drilled by Hudbay in 1981), where they consisted of a sequence of interbedded sandstones, siltstones and coals.

An extension was installed on the CTU deck of the West Triton rig and the cantilever was then skidded approximately 2.5m from the West Seahorse-3 slot. The Wardie-1 well was spudded at 19:30 hrs on 10 May 2008, using a 660 mm (20") Reed Rock Y1 1C bit with a 914 mm (36") Hole Opener. The seabed was tagged shallower than on the adjacent West Seahorse-3 well (39.5m water depth) due to a mound of cement being present around that well. The hole was drilled from the seabed at 76.8 m to 136.0 mMDRT. The hole section was drilled using seawater and hi-vis gel sweeps, with cuttings returned to the seabed. The 762 mm x 508 mm (30" x 20") casing was run and cemented with the 508 mm conductor shoe set at 133.0 mMDRT. After setting the conductor a 445 mm (171/2") Hughes MXLT1V tricone rock bit was made up on a directional BHA with MWD and the 445 mm section directionally drilled from 136.0 to 751.0 mMDRT. The 445 mm hole was also drilled using seawater and hi-vis gel sweeps, with cuttings dumped overboard to the sea from the CTU deck level as the riser and BOP were not yet installed. The well was kicked off at a depth of 250m and angle built to approximately 32.5 by 644 mMDRT and angle maintained for the remainder of the tangent section. The 340 mm (13.375") casing was run and cemented with the shoe set at 747.2 mMDRT.

After cementing the 340 mm surface casing string, the BOP stack and marine riser were installed. The BOPs were then pressure-tested and the diverter rigged up. The 311 mm hole section was drilled with a Reed RSX 61 6M-A1 6 PDC bit made up to a directional drilling BHA with Powerdrive and LWD tools. A thin cement stringer was tagged at 719.0 mMDRT which was reamed out and the string washed down to TOC at 732.5 mMDRT. The cement plugs, float collar, shoe track and 340 mm casing shoe at 747.2 mMDRT were drilled out using seawater and three meters of new formation cut to 754.0 mMDRT. The hole was then displaced to a KCl-Polymer water-based mud system initially weighted to 1.06 sg (8.8 ppg). The mud system was conditioned before pulling back into the shoe where a Formation Integrity Test (FIT) was performed with 1.06 sg mud yielding an Equivalent Mud Weight (EMW) of 1.57 sg/13.1 ppg (no leak-off). This bit drilled the entire section to well TD at 1766.0 mMDRT which was reached at 15:30 hrs on 18 May 2008. Hole angle and azimuth was maintained until the second kick-off point at ~1 208m where the well was steered down to the second tangent angle of under 9 through the Latrobe target interval. The bit was pulled out for wireline logging at TD, however a wiper trip was required as several intervals of tight hole with significant overpull were seen on the first trip out and it was necessary to pump and back-ream out all the way to the 340 mm casing shoe. There was also a tendency for the hole to pack-off in some places. After running the bit back to bottom (8m of fill encountered) and circulating the hole clean the drill string was pulled to surface without further incident.

After the wireline logging was successfully completed, the well was plugged and abandoned by setting four cement plugs. Cement plug #1A was set from 1766m to 1616 mMDRT and was followed by cement plug #1B from 1616m to 1513.0 mMDRT. The top of plug 1B was tagged with the cementing string at 1407 mMDRT after cement had hardened and was weight tested to 5 klbs. Cement plug #2 was then set across the 340 mm casing shoe from 805m to 700 mMDRT. This plug was allowed to harden before being pressure tested to 1000 psi. The final abandonment cement plug was set from 157m to 95 mMDRT after cutting the 340mm (13.375") casing at 126 mMDRT. Three attempts were then made to cut the 762 mm (30") conductor below the mudline at a depth of 78m, but these were all unsuccessful, despite some surface indications that the casing was at least partially cut. The 762mm (30") casing landing string was disconnected at the Quick-Jay connector 2m above the seabed and laid out. The CTU deck extension was then removed, the cantilever skid in and the rig jacked down.

The MODU West Triton was released from the Wardie-1 well location at 22:30 hrs on 25 May 2008

Final drilling well schematic

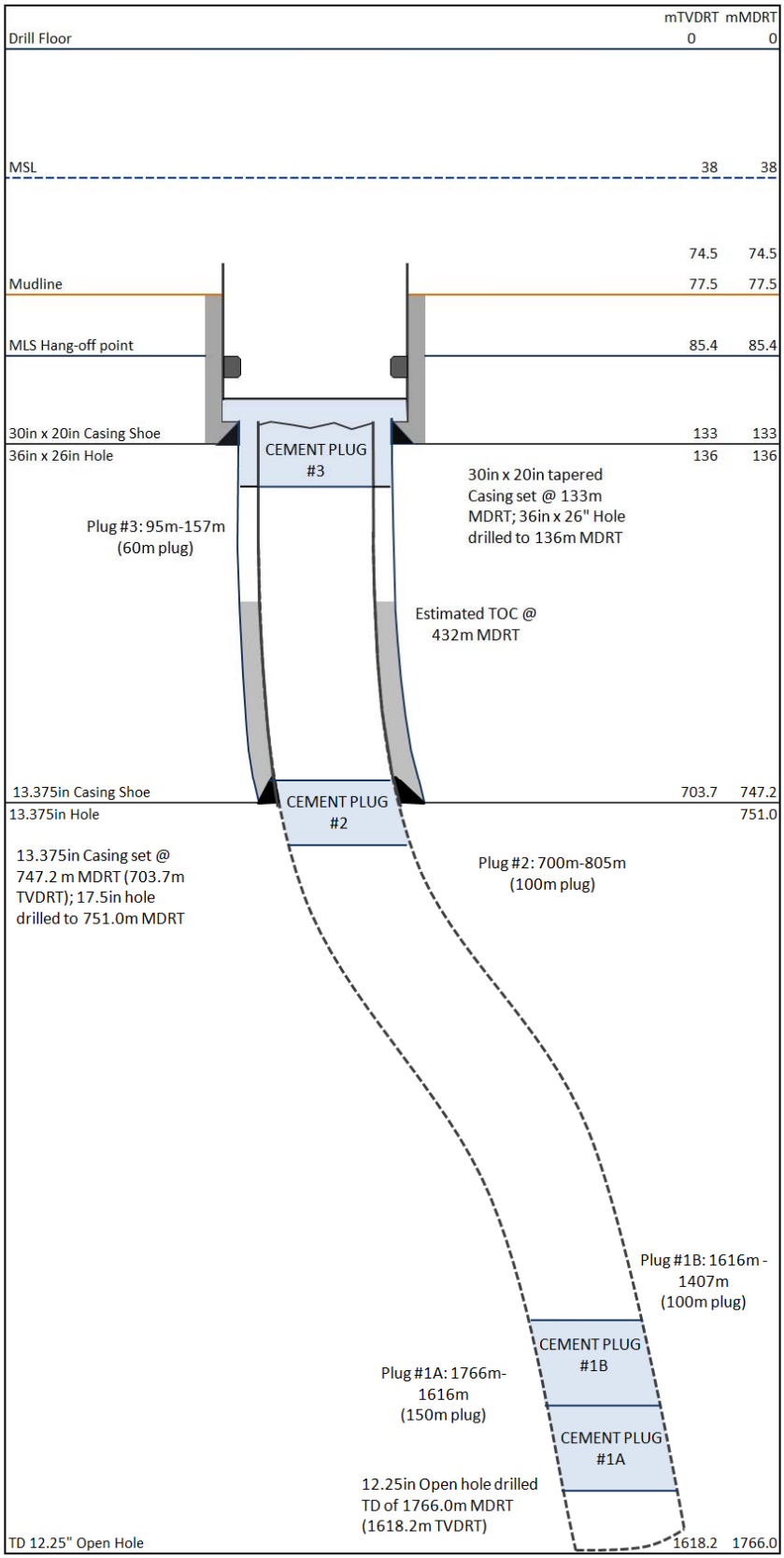


Figure 7. Summary of drilling schmatics and engineering.

Drilling & engineering

914 mm (36") Hole
Section 10 - 11 May 2008

Bit Run No. 1 Summary

Bit No.	RB1
Bit Size, mm	660 mm with 914 mm Hole Opener
Bit Type	Rock / Reed Y1 1 C
Serial Number	34406
Jets	3x22, 1x16
Depth In, mMDRT	76.8
Depth Out, mMDRT	136.0
Bit Grading	1-1-WT-A-NB-I-RR-TD

Drilling Parameters

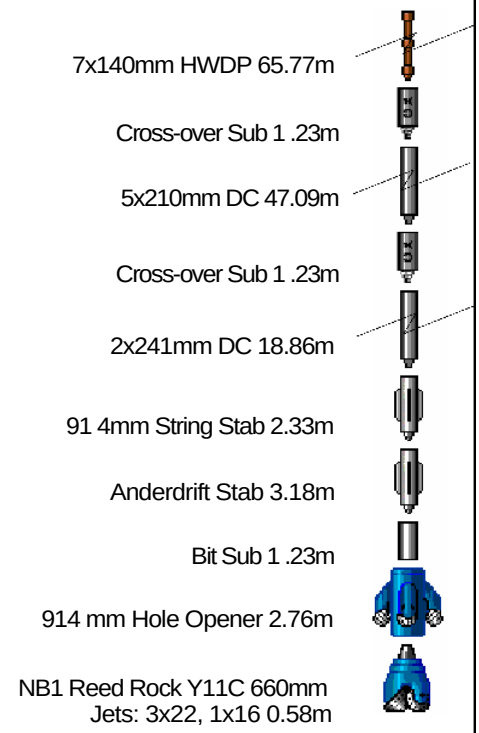
WOB, mt	0.3 – 5.7
RPM Surf	39 – 120
Pump Pressure, kPa	1055 – 9963
Flow In, lpm	1518 – 3789
Torque, kNm	0.04 – 5.87

Mud
Seawater 1.06 sg
High viscosity gel sweeps

Lithology
Returns to seabed.

Drilling Summary
This spud assembly was made up and run in, tagging the seabed at 76.8 mMDRT. Wardie-1 was spud at 1930hrs on 10 May 2008, drilling 914 mm hole from the mudline to 136.0 mMDRT. At TD, 200 bbl of flocculated gel was pumped to clean the hole which was then displaced with PHG mud prior to running the conductor.

BHA No. 1 144.26m



445 mm (17.5”) Hole Section
12 - 13 May 2008

Bit Run No. 2 Summary

Bit No.	NB2
Bit Size	445 mm
Bit Type	Hughes MXL-T1V
Serial Number	606589
Jets	3x20
Depth In.	136.0
Depth Out.	751.0
Bit Grading	1-1 -NO-A-0-I-NO-TD

Drilling

WOB, mt	0.4 – 22.4
RPM Surf	0 – 91
Pump Pressure,	4737 – 18650
Flow In, lpm	2063 – 4353
Torque, kNm	0 – 5.48

Mud

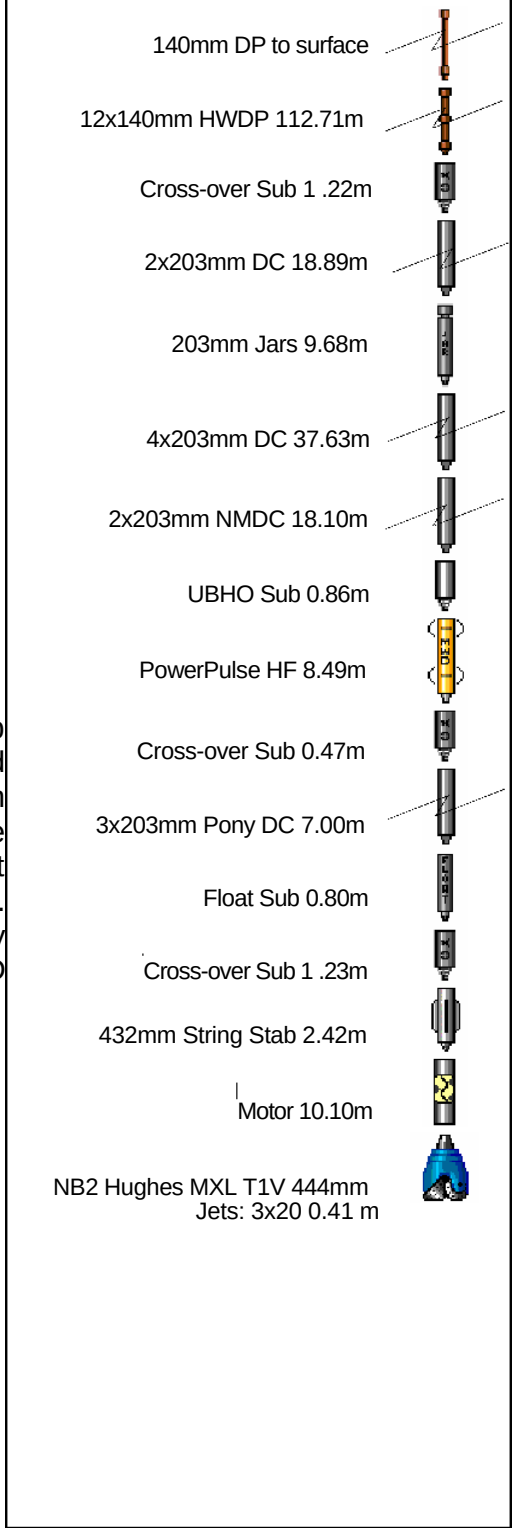
Seawater	1.06 sg

High viscosity gel sweeps

Lithology
Returns overboard from CTU deck.

Drilling Summary
A Hughes MXL-T1V tricone bit was made up to a directional drilling BHA with mud motor and MWD tools. The bit was washed down from 131 .0 mMDRT to the top of the 508 mm shoe at 132.8 mMDRT. The shoe was drilled out and rat hole cleaned out to 136.0 mMDRT. The 445 mm hole section was directionally drilled with seawater and hi-vis sweeps to the TD of the section at 751.0 mMDRT.

BHA No. 2 230.01 m



311 mm (12.25”) Hole
Section 16 - 19 May 2008

Bit Run No. 3 Summary

Bit No.	NB3
Bit Size	311 mm
Bit Type	Reed RSX 61 6M-A1 6
Serial Number	218629
Jets	3x15, 3x16
Depth In, MDRT	751.0
Depth Out, mMDRT	1766.0
Bit Grading	1-1 -NO-A-E-I-NO-TD

Drilling

WOB mt	0.3 – 17.4
RPM Surf	79 – 241
Pump Pressure	8405– 15072
Flow In lpm	3634 – 4262
Torque kNm	2.05 – 21.83

Mud

KCl-Polymer	1.07 – 1.13 sg

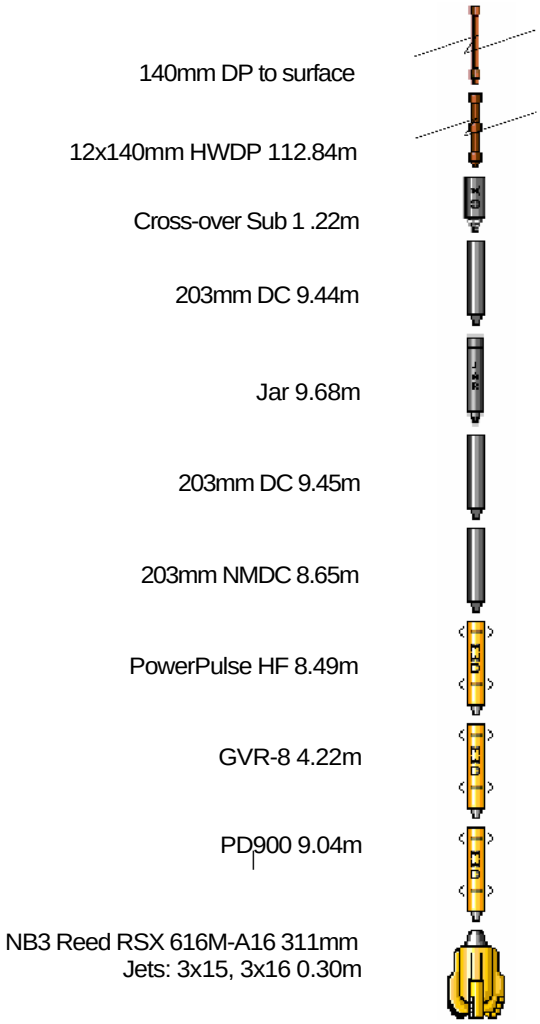
Lithology

Calcilutite, Calcisiltite, Calcarenite, Loose Sand, Calcareous Claystone, Carbonaceous Claystone, Siltstone, Sandstone, Coal

Drilling Summary

A PDC bit was made up to a directional drilling BHA with Powerdrive and LWD tools. After reaming through a thin cement stringer at 719 mMDRT, the bit was washed down to the top of the float collar at 732.5 mMDRT. The plugs, float collar and shoe track were drilled out using seawater. The hole was displaced to a KCl-Polymer water-based mud system initially weighted to 1 .06 sg (8.8 ppg) when drilling out the float shoe and then three metres of new formation was drilled to 754.0 mMDRT. After conditioning the new mud system, the bit was pulled back into the shoe and a Formation Integrity Test (FIT) was performed with 1 .06 sg mud yielding an Equivalent Mud Weight (EMW) of 1.57 sg. This PDC bit was directionally drilled to well TD at 1766.0 mMDRT.

BHA No.3 173.33m



Casing and Cementing

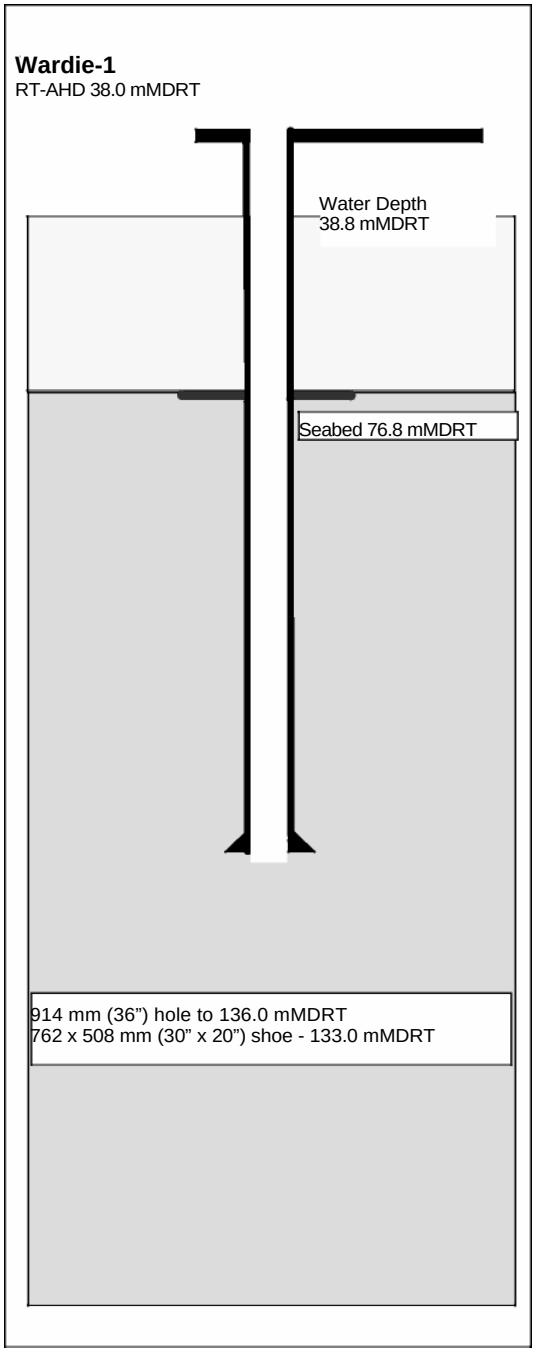
762 x 508 mm (30” x 20”) Casing
11 - 12 May 2008

Hole Size: 914 mm (36”)
Depth: 136.0 mMDRT

Casing Details
OD 762 mm (30”)
Grade/Wt: X 52 461 kg/m
Joints: 10 x 762 mm joint
1 x 508 mm shoe
Shoe: 133.0 mMDRT

Cement Details
SLURRY:
Type: Class G
Weight: 1.9 sg (15.9 ppg)
Slurry Volume: 42.1 m^3 (265 bbls)

Summary
The 762 x 508 mm conductor string was run on 11 May 2008. The conductor had to be suspended 3.5m above the mudline for two hours due to poor visibility and once visibility improved the string had to be circulated and worked into the surface hole as it was hanging up at the mudline due to a slight misalignment. Each joint of casing was filled with sea water wile being run in. The string took weight at 130 mMDRT and had to be washed down from 130m to 133 mMDRT. The 508 mm shoe was set and cemented at 133.0 mMDRT as per the casing tally and then cemented in place. Prior to the cement job, the surface line was tested to 1000 psi. Then a preflush consisting of 14.3 m^3 (90 bbls) of seawater was pumped followed by 3.2 m^3 (20 bbls) of seawater with fluoroscein dye. The cement job comprised pumping of 42.1 m^3 (265 bbls) of 1 .9 sg (15.9 ppg) class “G” slurry. This was 20% over the theoretical annular volume and there were returns observed at the mudline by the ROV. The cement was displaced with 1 .6 m^3 (10 bbls) of seawater. After the cement had been pumped and the floats checked, the cement stinger and the 140 mm drill pipe were pulled to surface.



340 mm (1 3.375") Casing
14 - 15 May 2008

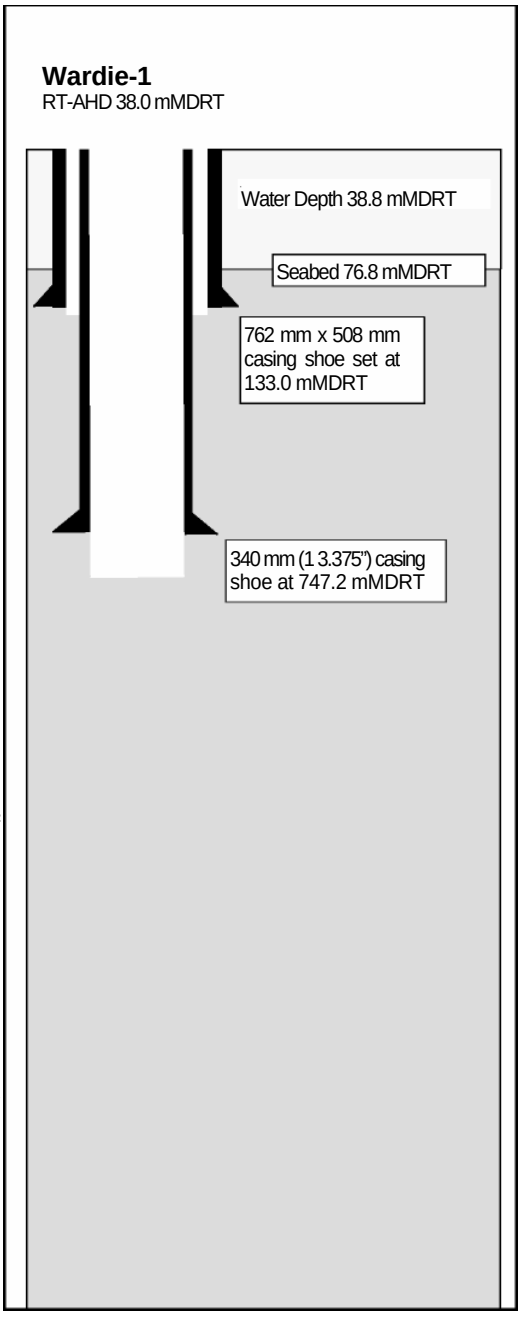
Hole Size: 444 mm (17.5")
Depth: 751.0 mMDRT

Casing Details

OD	340mm (1 3.375")
Grade / Wt:	N80: 101 kg/m (68 ppf)
Joints:	1 Shoe joint
	1 Float Collar joint
	56 x Casing joints +
	5 Landing Joints (CTU to MLS)
Shoe:	747.2 m

Cement Details

SLURRY:
Type: Class G
Weight: 1.90 sg (15.8 ppg)
Slurry Volume: 23.8 m^3 (150 bbls)



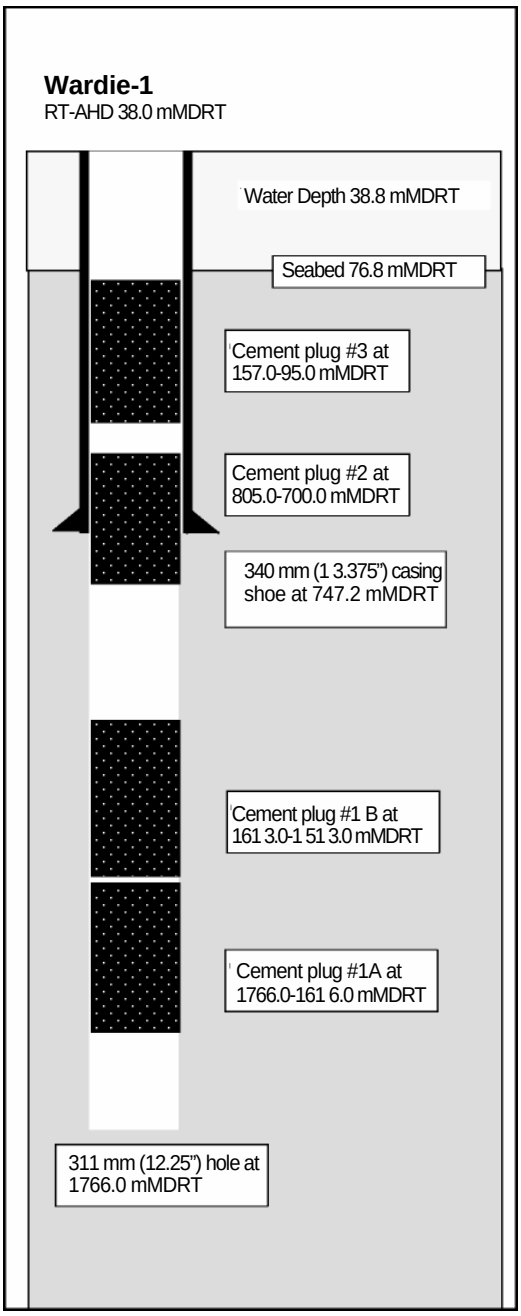
Summary

The 340 mm casing was run in hole as per 3D Oil's casing program. There was a great deal of difficulty running the casing in hole initially as the centralisers continually hung up on the mudline suspension. An attempt was made to improve the casing alignment with the wellbore by skidding the cantilever slightly but it was still not possible to work the casing down past 166 mMDRT. The casing was pulled back to surface and all centralisation removed. A new float collar joint was made up and the casing re-run to landing depth without further problems. Once the casing was landed, the casing volume was circulated and then the cement lines pressure tested to 4000 psi. A preflush of 14.3 m^3 (90 bbls) of seawater and 4.7 m^3 (30 bbls) of tuned spacer E+ was pumped ahead. The cement job consisted of 23.8 m^3 (150 bbls) of 1.9 sg (15.8 ppg) class "G" slurry. The cement was displaced with 53.6 m^3 (337 bbls) of sea water. The plug was bumped to 2000 psi. The casing shoe was set at 747.2 mMDRT.

Cement Plugs

21 - 22 May 2008

Hole Size: 311 mm (12.25")
Depth: 1766.0 mMDRT



Cement Plug Details

CEMENT PLUG #1A:
- Type: Class G
- Weight: 1.89 sg (1 5.8 ppg)
- Slurry Vol:13.51 m ^{3} (85 bbls)

CEMENT PLUG #1 B:
- Type: Class G
- Weight: 1.89 sg (1 5.8 ppg)
- Slurry Vol:10.17 m ^{3} (64 bbls)

CEMENT PLUG #2:
- Type: Class G
- Weight: 1.90 sg (15.9 ppg)
- Slurry Vol:9.22 m ^{3} (58 bbls)

CEMENT PLUG #3:
- Type: Class G
- Weight: 1.89 sg (15.8 ppg)
- Slurry Vol:14.7 m ^{3} (93 bbls)

Summary

Four cement plugs were pumped to P&A the Wardie-1 well. The cement stinger consisted of a mule shoe made up on 140 mm drill pipe. The cementing string was run in hole to 1765 mMDRT, bottoms up was circulated and then the cement lines were rigged up and tested to 1000 psi. All slurry volumes in the open hole were calculated using a 10% excess to the caliper volume. Cement plug #1A was set from 1766m to 1616 mMDRT and was followed by cement plug #1B from 1616m to 1513 mMDRT. After waiting on cement to harden, the string was washed down from 1398m and tagged top of cement plug #1B at 1407 mMDRT. The plug was weight tested with 5 klbs. Cement plug #2 was set across the 340 mm casing shoe from 805m to 700 mMDRT. The BOPs, riser, choke lines, and surface lines were flushed and then Plug #2 was successfully pressure tested to 1000 psi for 10min. The 340 mm (13.375") casing was then cut at 126 mMDRT and the cut joints pulled to surface. The final cement plug #3 was set from 157m to 95 mMDRT. Three attempts were made to cut the 762 mm (30") conductor at 78 mMDRT without success, so the 762mm landing joints were disconnected at the Quick-Jay connector 2m above the mudline and pulled to surface.

Bit Run summary

OPERATOR: 3D Oil Ltd | WELL NAME: Wardie-1 | LOCATION: VIC/P-57 | CONTRACTOR: Seadrill | RIG: (MODU) West Triton

Mud Pump Data
Pumps 1, 2, and 3
165 mm 6.5" Liners
355 mm 14" Stroke
97% Efficiency, 16.03 litre/stk (0.1394 bbl/stk)

BIT DULL CHARACTERISTICS

REASONS PULLED

BHA #	BIT No.	MAKE	TYPE	TFA sq.in.	JETS	SERIAL No.	DEPTH IN m	METRES ON BIT	HRS ON BOTTOM	AV ROP m/hr	CIRC HRS	WOB tonne	RPM Surf/Motor	TBR krev	SPP kPa	FLOW lpm	TQ kNm	GRADE I	O	D	L	B	G	O	R	MW SG	REMARKS
Wardie-1																											
914 mm (36") Hole Section 76.8 - 136.0 mMDRT																											
1	RB1	Reed	Y11C	1.3100	3x22, 1x16	34406	76.8	59.2	2.3	25.7	4.3	2.5	39-120/39-120	13.9	1055-9963	1518-3789	0.04-5.87	1	1	WT	A	NB	I	RR	TD	SW (1.06)	Spud
444 mm (17.5") Hole Section 136.0 - 751.0 mMDRT																											
2	NB2	Hughes	MXL-T1V	0.9204	3x20	606589	136	615	6.7	91.8	11.9	9.9	0-91/58-217	60.7	4737-18650	2063-4353	0-5.48	1	1	NO	A	0	I	NO	TD	SW (1.06)	13.375" Casing point
311 mm (12.25") Hole Section 751.0 - 1766.0 mMDRT TD																											
3	NB3	Reed	RSX 616M-A16	1.1068	3x15, 3x16	218629	751	1015	19.4	52.3	44.9	8.5	79-241/79-241	172.8	8405-15072	3634-4262	2.05-21.83	1	1	NO	A	E	I	NO	TD	1.07 - 1.13	TD

RT-AHD (m) 38.0 m
RT - Seabed 76.8 mMDRT
Total Depth (m) 1766.0 mMDRT

Bits run: time : depth chart

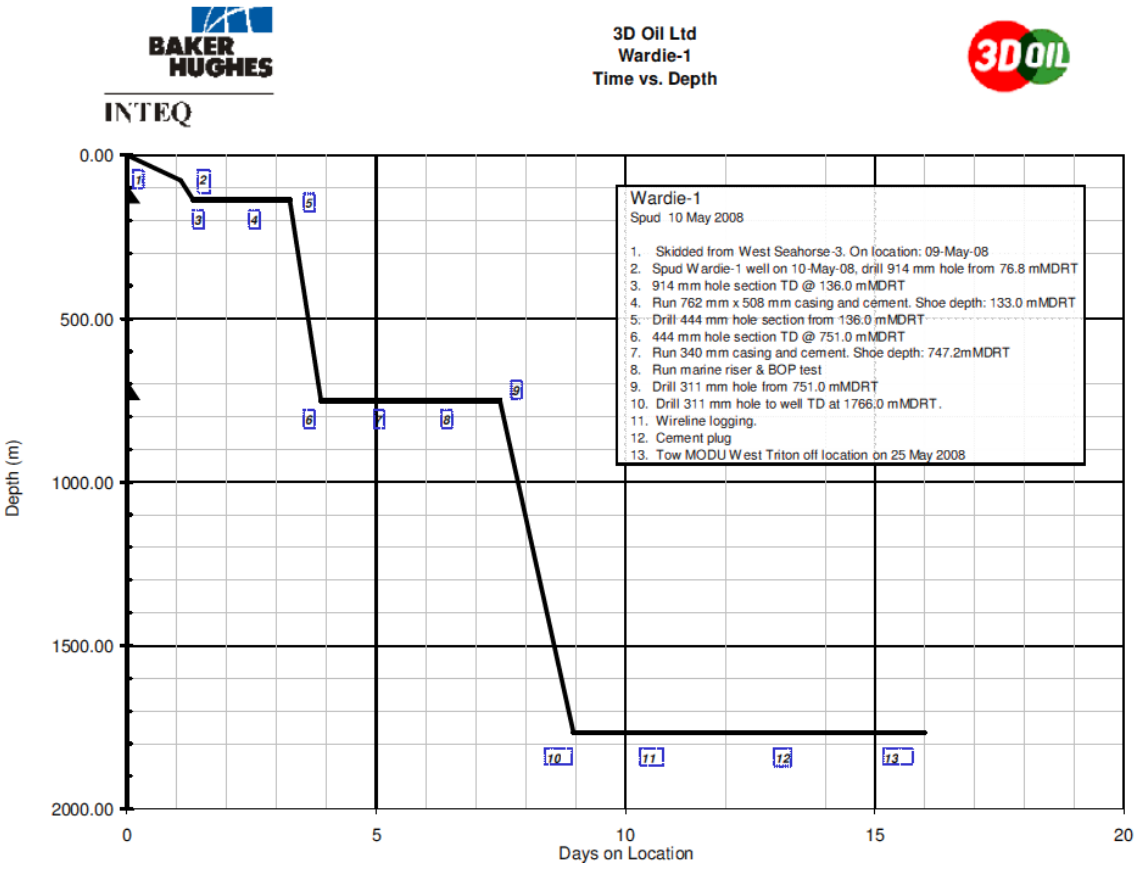


Figure 8. Summary of casing and cementing schematics by time vs. depth scale.

Bit Hydraulics summary

BAKER HUGHES INTEQ

Bit Hydraulics Summary

Operator	Well Name	Location	Drilling Contractor	Rig
3D Oil Ltd	Wardie-1	VIC/P-57	Seadrill	MODU West Triton

Drillstring Abbreviations
N Normal **P** Positive Displacement Motor **S** Powerdrive
M MWD **A** Adjustable Gauge Stabilizer **T** TRACS Tool **C** Core

Hydraulics Models
Power Law Model used for drilling with Mud
Bingham Model used for coring and drilling with seawater

Bit No.	Depth AHD (m)	Hole Size in	Jets x 1/32"	Drill String Type	Mud Type	Mud Density sg	PV mPas	YP Pa	Flow Rate lpm	Jet Vel m/sec	Impact Force lbf / in²	Hydraulic Power hhp	Power/ Area hp/sq in	Bit Loss KPa	Bit Loss %	Pipe* Loss Kpa	ECD sg	Annular Velocities DP OH m/sec	Annular Velocities DC OH m/sec	Annular Velocities DP Max Dia m/sec
Wardie-1																				
914 mm (36") Hole Section 76.8 - 136.0 mMDRT																				
RB1	136	36"	3x22, 1x16	N	SW / PHG sweep	1.06	-	-	3789	42.4	0.7	622	0.08	917	12.4	6439	1.060	-	0.10	-
444 mm (17.5") Hole Section 136.0 - 751.0 mMDRT																				
NB2	751	17.5"	3x20	N, M, P	SW / PHG sweep	1.06	-	-	4353	122.1	8.8	1716	3.11	7605	43.1	10045	1.062	0.52	0.60	0.19
311 mm (12.25") Hole Section 751.0 - 1766.0 mMDRT																				
NB3	1766	12.25"	3x15, 3x16	N, M, A	KCl-Polymer	1.13	13	13.9	4088	95.4	14.0	1395	3.89	4943	32.4	10328	1.162	1.12	1.12	0.27

* Note: Pipe Loss includes DP,HWDP, DC, MWD, Motor,Additional tools, surf equipment

Directional drilling summary

Performance drilling report

BHA 38 / Bit 2

17 1/2" (445 mm) Steerable Motor Assembly
136m – 751m MD

BHA

17 1/2" Hughes MXL-T1V Tooth Bit (3 x 20 jets)
9 5/8 PowerPak Motor (5:6 lobe, 4.0 stage, 17 1/4 sleeve and 1.5º bend) 17" String Stab
Crossover Sub Float Sub
3 x 8" Pony NMDC
Crossover Sub
PowerPulse MWD (800-1200 gpm)
UBHO
2 x 8" NMDC
8 1/4" Spiral Drill Collars (4 joints)
Hydraulic Jar
8 1/4" Spiral Drill Collar (2 joints)
Crossover Sub
5 1/2" HW Drill Pipe (12 joints)
5 1/2" Drill Pipe to Surface

Drilling Summary

Drilled cement and float equipment, cleaned out rat hole. This well was approximately 2.5 m from West Seahorse-3 so magnetic interference was encountered in the MWD surveys once drilling commenced. At 172m with inclination only surveys there was a high risk of collision with West Seahorse-3 so Gyro surveys were taken to confirm the actual azimuth. The Gyro surveys indicated that the well was diverging from West Seahorse-3 so the drilling commenced. At 200m no magnetic interference was encountered from the MWD surveys so these were used from this point onwards.

Rotary drilling continued to kick off point at 250m. Kick off building at 3º/30m to 32.48ºm along the azimuth of 241.15º azimuth. Continue drilling tangent section to casing point at 751m MDRT. This assembly is capable of building up to 4.8º/30m. Reactive torque was about 45º with 25 klbs WOB

No hole problems were encountered and all directional requirements were met. While tripping out of the hole the BHA got stuck at the shoe. The most likely cause was the 17" stabilizer getting stuck at the shoe. The BHA was rotated out with no resistance encountered.

Drilling Performance

Interval	Distance (m)	Time (hrs)	ROP (m/hr)
Total Drilled	615	6.7	91.79
Total Drilled in rotary	353	3.76	93.88
Total Drilled in slide mode	262	2.94	89.12
Bit Graded	1-1-NO-A-E-I-NO-TD (61 krevs)		

Section Breakdown

Section	Rotary m (%)	Slide m (%)
Start of run to KOP (136-250m)	125 (100%)	-
KOP to EOC (250-574m)	105 (32%)	219 (68%)
EOC to section TD (574-751m)	134 (76%)	43 (24%)

BHA 4 / Bit 3
12 1/4" (311 mm) Rotary Steerable Assembly 751m –
1766 m MD (1015m)

BHA
12 1/4" Reed Hycalog RSX616 MA 16 PDC Bit (3 x 15 & 3 x 16 jets) PowerDrive 900 X5 (without flow restrictor)
PowerDrive 900 Receiver (with ported float) and Flex Collar
8 1/4" GVR
PowerPulse MWD (600-1200 gpm)
1 x 8" NMDC
8 1/4" Spiral Drill Collars
Hydraulic Jar
8 1/4" Spiral Drill Collar
Crossover Sub
5 1/2" HW Drill Pipe (12 joints)
5 1/2" Drill Pipe to Surface

Drilling Summary
After drilling out cement and float equipment, three meters of new formation was drilled and a formation integrity test was performed.

Once out of the shoe the PowerDrive assembly had a dropping tendency in neutral steering mode of around 0.8º/30m. The tangent section of the well profile was drilled in inclination hold mode and increasing the right azimuth steering percentage accordingly to follow the planned well trajectory. The drilling parameters were adjusted to maintain a rate of penetration of around 115 m/hr.

In the previous well (West Seahorse-3) it was initially difficult to achieve the required drop rate so the drop section in this well was started deliberately at 1208m, 90m ahead of plan to allow for a lower drop rate than the plan. Drop rates of 1 .16º/30m to 1 .45º/30 m for the first 243m were achieved when the tool was set at 25% steering ratio and 180º tool face. It was later altered accordingly to increase the drop and turn rates. The rate of penetration was held back to 30 m/hr from 1522m onwards for logging purposes.

Once the drop was achieved the PowerDrive was placed in Inclination Hold mode for the remainder of the tangent section to TD at 1 766m MDRT. Both geological targets were successfully penetrated within the allowable tollerances.

Moderate stick-slip was observed for most of the run but it did not affect the steering ability. A few hard drilling intervals were encountered and higher stick slip and torque variance was experienced. While tripping out sticky hole sections were encountered all the way up to the 13 3/8" shoe. The BHA was washed and back reamed through these sections and a subsequent wiper trip to TD point was performed.

The bit was graded as 3-3-WT-A-X-I-CT-TD.

Drilling Performance;

Interval	Distance (m)	Time (hrs)	ROP (m/hr)
Rotary mode	1015	19.40	52.32

Deviated well, 'S'-type profile.
Details see attachment 7

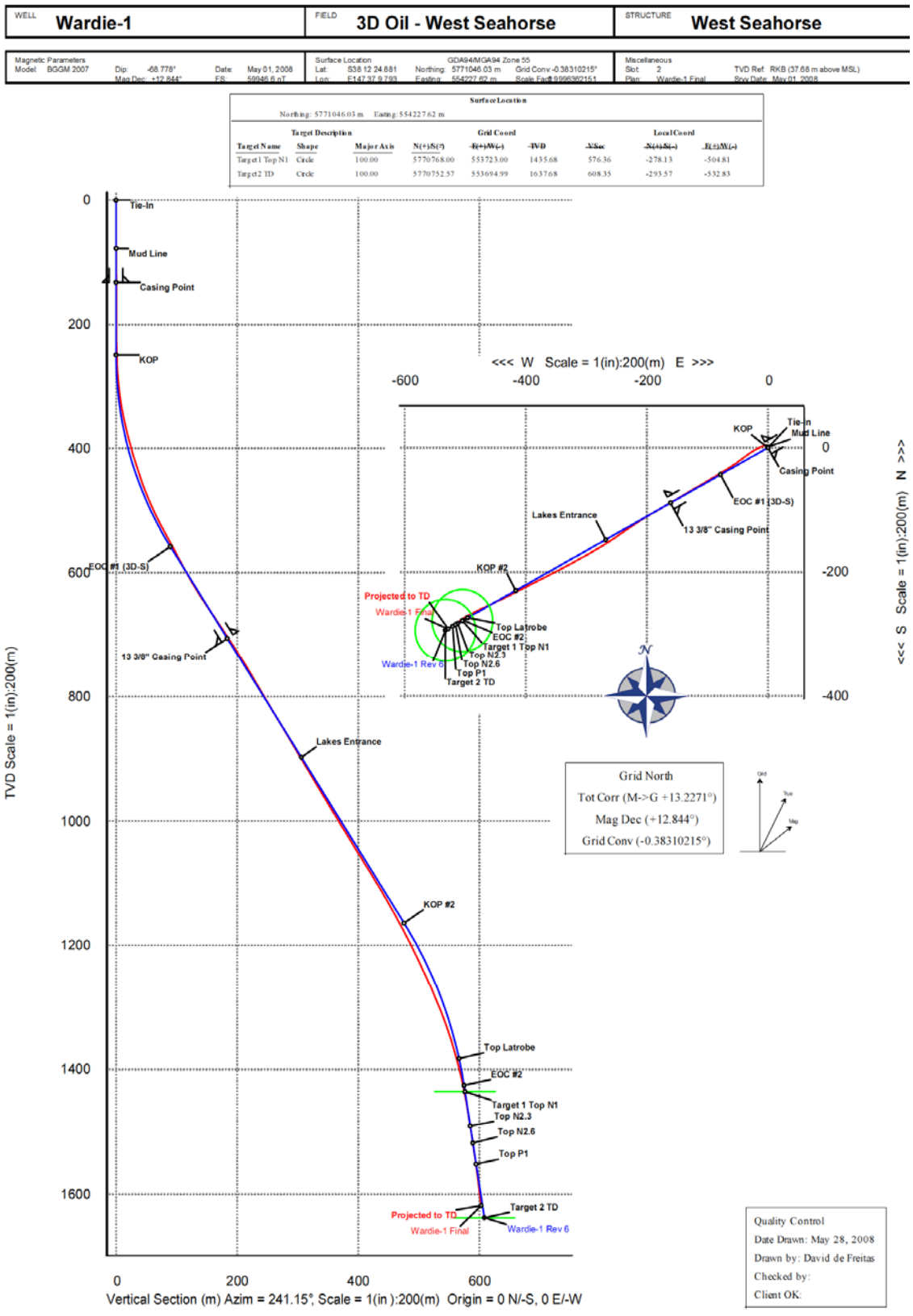


Figure 9. Sketch showing 'S'-type directional drilling profile.

Directional Dmag Geodetic Survey

Wardie-1 Final EOU Report

Comments	Measured Depth (m)	Inclination (deg)	Azimuth Grid (deg)	TVD (m)	Vertical Section (m)	NS Grid North (m)	EW Grid North (m)	DLS (deg/30m)	Semi-Axis Major NEV (m)	Semi-Axis Minor NEV (m)	EOU Unc Vertical (m)	Major Axis Azimuth NEV (deg)	Survey Tool Model
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.16	0.00	90.00	SLB_CNSG+DPIPE-Depth Only
Mud Line	77.50	1.96	317.71	77.48	0.31	0.98	-0.89	0.76	0.17	0.16	0.61	137.65	SLB_CNSG+DPIPE
	82.50	1.90	317.51	82.48	0.35	1.10	-1.01	0.36	0.17	0.17	0.61	137.42	SLB_CNSG+DPIPE
	87.50	1.85	317.30	87.48	0.39	1.23	-1.12	0.30	0.19	0.19	0.62	137.21	SLB_CNSG+DPIPE
	92.50	1.80	317.07	92.48	0.42	1.34	-1.22	0.30	0.21	0.21	0.63	137.03	SLB_CNSG+DPIPE
	97.50	1.74	316.83	97.47	0.46	1.45	-1.33	0.36	0.23	0.23	0.63	136.87	SLB_CNSG+DPIPE
	102.50	1.69	316.58	102.47	0.50	1.56	-1.43	0.30	0.25	0.25	0.64	136.72	SLB_CNSG+DPIPE
	107.50	1.63	316.30	107.47	0.54	1.67	-1.53	0.36	0.27	0.27	0.65	136.57	SLB_CNSG+DPIPE
	112.50	1.65	315.91	112.47	0.57	1.77	-1.63	0.14	0.28	0.28	0.66	136.37	SLB_CNSG+DPIPE
	117.50	1.78	316.62	117.47	0.61	1.88	-1.73	0.79	0.29	0.28	0.67	136.54	SLB_CNSG+DPIPE
	122.50	1.86	319.95	122.46	0.65	2.00	-1.84	0.80	0.29	0.29	0.67	137.94	SLB_CNSG+DPIPE
	127.50	1.88	323.69	127.46	0.67	2.13	-1.94	0.74	0.30	0.30	0.68	140.03	SLB_CNSG+DPIPE
	132.50	1.94	328.33	132.46	0.69	2.26	-2.03	0.99	0.32	0.32	0.69	142.37	SLB_CNSG+DPIPE
	134.60	2.03	330.59	134.56	0.69	2.33	-2.07	1.70	0.32	0.32	0.70	144.37	SLB_CNSG+DPIPE
	174.15	0.97	331.19	174.09	0.70	3.23	-2.58	0.80	0.39	0.39	0.99	146.82	SLB_MWD-STD
	202.30	1.06	330.50	202.24	0.70	3.67	-2.82	0.10	0.39	0.39	0.99	98.40	SLB_MWD-STD
	260.44	2.12	269.17	260.36	1.66	4.12	-4.16	0.96	0.41	0.41	0.99	35.23	SLB_MWD-STD
	290.09	5.23	252.00	289.94	3.47	3.69	-5.99	3.30	0.47	0.47	1.00	31.23	SLB_MWD-STD
	319.76	8.62	244.27	319.39	7.02	2.31	-9.28	3.55	0.57	0.55	1.00	7.35	SLB_MWD-STD
	349.23	11.69	243.65	348.40	12.21	0.03	-13.95	3.13	0.70	0.64	1.00	170.06	SLB_MWD-STD
	378.56	14.54	243.39	376.96	18.86	-2.94	-19.91	2.92	0.86	0.74	0.99	163.04	SLB_MWD-STD
	408.20	16.62	238.69	405.51	26.81	-6.81	-26.85	2.46	1.06	0.85	1.00	158.62	SLB_MWD-STD
	437.65	18.41	234.18	433.60	35.63	-11.72	-34.22	2.29	1.28	0.95	1.00	155.19	SLB_MWD-STD
	466.98	21.11	233.22	461.20	45.46	-17.60	-42.21	2.78	1.54	1.06	1.01	152.65	SLB_MWD-STD
	496.44	24.52	235.86	488.35	56.81	-24.21	-51.52	3.62	1.84	1.18	1.02	151.24	SLB_MWD-STD
	525.34	27.44	238.00	514.33	69.43	-31.10	-62.14	3.18	2.18	1.31	1.03	150.55	SLB_MWD-STD
	555.68	29.78	239.10	540.96	83.94	-38.68	-74.53	2.37	2.57	1.45	1.06	150.22	SLB_MWD-STD
	585.40	28.02	239.82	566.98	98.30	-45.98	-86.90	1.81	2.91	1.53	1.08	150.05	SLB_MWD-STD
	614.89	29.13	240.00	592.88	112.40	-53.05	-99.11	1.13	3.24	1.61	1.12	149.98	SLB_MWD-STD
	644.23	31.31	240.28	618.23	127.17	-60.40	-111.91	2.23	3.66	1.75	1.17	150.03	SLB_MWD-STD
	674.32	33.98	240.54	643.56	143.40	-68.41	-126.03	2.67	4.12	1.90	1.23	150.10	SLB_MWD-STD
	703.79	34.90	240.07	667.87	160.06	-76.67	-140.50	0.97	4.59	2.05	1.29	150.10	SLB_MWD-STD
	722.54	34.35	239.86	683.29	170.71	-82.00	-149.73	0.90	4.86	2.12	1.33	150.07	SLB_MWD-STD
	802.80	32.02	241.09	750.46	214.63	-103.66	-187.94	0.91	5.88	2.32	1.47	150.06	SLB_MWD-STD
	831.50	30.76	239.33	774.96	229.58	-111.08	-200.91	1.63	6.24	2.40	1.53	149.98	SLB_MWD-STD
	861.51	31.64	238.19	800.63	245.11	-119.15	-214.20	1.06	6.65	2.52	1.60	149.86	SLB_MWD-STD
	891.22	31.39	236.51	825.96	260.60	-127.53	-227.28	0.92	7.06	2.65	1.67	149.65	SLB_MWD-STD
	920.19	31.58	236.01	850.66	275.68	-135.93	-239.86	0.33	7.47	2.77	1.74	149.44	SLB_MWD-STD
	949.76	31.70	236.73	875.84	291.14	-144.52	-252.78	0.40	7.88	2.90	1.81	149.29	SLB_MWD-STD
	979.78	31.37	237.60	901.42	306.80	-153.03	-265.97	0.56	8.28	3.02	1.88	149.19	SLB_MWD-STD
	1009.21	31.56	240.47	926.53	322.15	-160.93	-279.14	1.54	8.68	3.13	1.95	149.25	SLB_MWD-STD
	1039.05	31.64	239.79	951.94	337.78	-168.72	-292.70	0.37	9.10	3.26	2.02	149.26	SLB_MWD-STD
	1066.59	31.64	241.83	975.39	352.22	-175.77	-305.31	1.17	9.48	3.38	2.09	149.37	SLB_MWD-STD
	1096.55	32.01	242.11	1000.85	368.02	-183.19	-319.25	0.40	9.91	3.51	2.17	149.48	SLB_MWD-STD
	1125.94	32.34	242.75	1025.72	383.67	-190.43	-333.13	0.48	10.34	3.65	2.25	149.62	SLB_MWD-STD
	1155.71	32.17	242.53	1050.90	399.55	-197.74	-347.24	0.21	10.77	3.78	2.33	149.72	SLB_MWD-STD
	1184.60	32.35	243.98	1075.33	414.96	-204.67	-361.01	0.83	11.17	3.90	2.40	149.88	SLB_MWD-STD
	1214.81	32.18	244.06	1100.88	431.07	-211.74	-375.50	0.17	11.60	4.02	2.48	150.03	SLB_MWD-STD
	1244.86	30.73	243.07	1126.51	446.73	-218.72	-389.55	1.54	12.01	4.13	2.55	150.12	SLB_MWD-STD
	1274.25	29.50	243.74	1151.93	461.47	-225.32	-402.73	1.30	12.39	4.24	2.61	150.23	SLB_MWD-STD
	1303.82	28.32	243.43	1177.82	475.75	-231.68	-415.53	1.21	12.75	4.34	2.67	150.32	SLB_MWD-STD
	1333.24	26.97	243.84	1203.88	489.39	-237.74	-427.76	1.39	13.10	4.45	2.73	150.41	SLB_MWD-STD
	1363.33	25.76	244.51	1230.84	502.73	-243.56	-439.79	1.24	13.45	4.56	2.79	150.52	SLB_MWD-STD
	1392.32	24.64	245.10	1257.07	515.05	-248.82	-450.96	1.19	13.77	4.66	2.84	150.62	SLB_MWD-STD
	1421.66	23.41	245.94	1283.87	526.96	-253.77	-461.83	1.31	14.07	4.76	2.89	150.74	SLB_MWD-STD
	1451.54	21.93	245.34	1311.44	538.44	-258.52	-472.32	1.50	14.37	4.86	2.93	150.83	SLB_MWD-STD
	1481.24	19.28	245.06	1339.23	548.86	-262.90	-481.81	2.68	14.63	4.95	2.96	150.91	SLB_MWD-STD
	1511.19	16.74	243.33	1367.71	558.11	-266.92	-490.15	2.60	14.86	5.03	2.99	150.93	SLB_MWD-STD
	1540.85	14.49	240.57	1396.28	566.09	-270.66	-497.20	2.40	15.06	5.10	3.02	150.91	SLB_MWD-STD
	1570.22	12.40	236.98	1424.84	572.91	-274.19	-503.04	2.30	15.22	5.17	3.03	150.83	SLB_MWD-STD
	1599.76	10.35	236.26	1453.80	578.72	-277.39	-507.91	2.09	15.36	5.23	3.05	150.79	SLB_MWD-STD
	1630.16	9.46	236.73	1483.75	583.93	-280.28	-512.27	0.88	15.49	5.28	3.07	150.76	SLB_MWD-STD
	1659.89	8.81	235.87	1513.10	588.63	-282.90	-516.20	0.67	15.60	5.33	3.08	150.72	SLB_MWD-STD
	1689.37	8.19	235.45	1542.26	592.97	-285.35	-519.79	0.63	15.71	5.38	3.09	150.68	SLB_MWD-STD
	1718.81	7.67	235.27	1571.41	597.01	-287.66	-523.14	0.53	15.80	5.43	3.10	150.65	SLB_MWD-STD
	1745.67	7.36	234.18	1598.04	600.50	-289.69	-526.00	0.38	15.89	5.47	3.11	150.61	SLB_MWD-STD
Projected to TD	1766.00	7.36	234.18	1618.21	603.08	-291.21	-528.12	0.00	16.25	5.70	3.16	150.35	SLB_BLIND+TREND

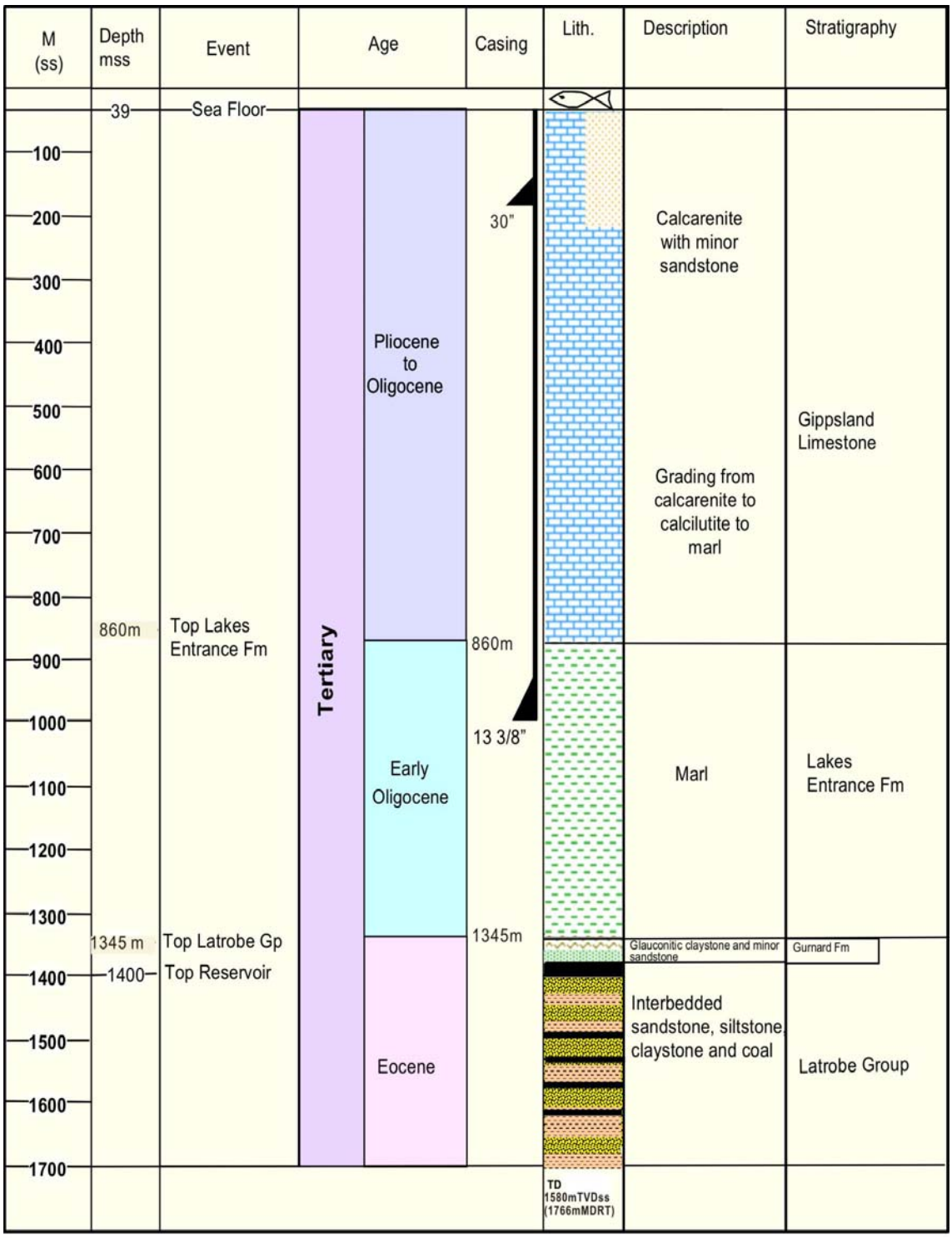


Figure 10. Lithological column and casing of the Wardie 1 well.

5. GEOLOGICAL SAMPLING & EVALUATION

Formation sampling & drill monitoring

Baker Hughes INTEQ SLS provided formation evaluation and drill monitoring services for Wardie-1 between 09 May and 25 May 2008 from the spud depth at 76.8 mMDRT to the well's total depth of 1766.0 mMDRT. Data was processed and stored using **Advantage version 2.10U2** software. All depths in this report are measured depth below Rotary Table (mMDRT) referenced to Australian Height Datum (AHD) unless otherwise stated.

All gas monitoring equipment was calibrated before drilling and checked regularly. Ditch cuttings were continuously collected through the drilling and Calcimetry analysis on cuttings samples was performed at the request of the Wellsite Geologists. Formation pressures and samples were taken with the Schlumberger MDT tool. Two oil samples were collected from a depth of 1582.4mMDRT.

Sampling summary

Cuttings samples were collected at the intervals tabulated below as advised by the Well site Geologists.

751 – 770 m	19 m interval
770 – 1320 m	20 m interval
1320 – 1520 m	10 m interval
1520 – 1760 m	5 m interval
1760 – 1766 m	6 m interval

The following washed samples were combined with the respective next available due to high ROP: 1350m, 1370m, 1440m, 1510m, 1565m, 1745m, 1750m, 1755m

The following unwashed samples were combined with the respective next available due to insufficient cuttings at the shakers:1490, 1520, 1525, 1540, 1545, 1645, 1650, 1665, 1670, 1710, 1725, 1740, 1760 & 1766m.

The following unwashed samples were combined with the respective next available due to insufficient cuttings at the shakers: 1440, 1505, 1510, 1515, 1565, 1745, 1750 & 1755m.

Sample Distribution

Set A (250g Unwashed Cuttings in Hubco bags) to be forwarded to:
3D Oil Limited Kensington Road Self Storage
180 Kensington Road
West Melbourne, Vic, 3003

Set B (250g Washed & Dried Drill Cuttings in polythene bags) to be forwarded to: *3D Oil Limited*
Kensington Road Self Storage
180 Kensington Road
West Melbourne, Vic, 3003

Set C (Samplex Tray) to be forwarded to:

3D Oil Limited
Kensington Road Self Storage
180 Kensington Road
West Melbourne, Vic, 3003

Set D (250g Washed & Dried Drill Cuttings in polythene bags) to be forwarded to:

Victorian Dept of Primary Industries
DPI Core Sample Library
18 South Road
(250 m south of Sneydes Road)
WERRIBEE 3030 (Melway Reference: 206 E8)

Set E (250g Washed & Dried Drill Cuttings in polythene bags) to be forwarded to:

Geoscience Australia
Manager,
Geoscience Australia Data Repositories
Geoscience Australia
Cnr Jerrabomberra Avenue and Hindmarsh Drive,
Symonstonymonston, ACT, 2609

Set F (Mud Sample & Mud Filtrate) to be forwarded to:

3D Oil Limited
Kensington Road Self Storage
180 Kensington Road
WEST MELBOURNE, ViC, 3003

SAMPLE TYPE	No. of Sets	INTERVAL			PACKING DETAILS
		Large Box No.	Small Box No.	Interval (m)	
UNWASHED SAMPLES: Set **A**	**1**	**1**	1	751 – 850	Packed in 3 boxes marked as Set A
			2	850 – 950	
			3	950 – 1050	
			4	1050 – 1150	
			5	1150 – 1250	
			6	1250 – 1360	
			7	1360 – 1430	
			8	1430 – 1490	
		2	9	1490 – 1540	
			10	1540 - 1575	
			11	1575 – 1600	
			12	1600 - 1625	
			13	1625 - 1650	
			14	1650 - 1675	
		3	15	1675 - 1700	
			16	1700 – 1725	
			17	1725 - 1766	
DRILL CUTTINGS 250g: Washed & Air Dried (polythene bags) Sets **B, D** & **E** from 751 – 1766 m	**3**	**1**	1	751 – 990	3 Large boxes marked as Set B, D & E
			2	990 – 1250	
			3	1250 – 1430	
			4	1430 – 1550	
			5	1550 – 1600	
			6	1600 – 1655	
			7	1655 – 1715	
			8	1715 – 1766	
SAMPLEX TRAYS: Set **C**	**1**			751 - 1766	Packed in 1 wooden box marked as Set C
MUD SAMPLES & MUD FILTRATE: Set **F**	**1**			751 - 1766	Packed in one box marked as Set F

Geological formation evaluation

Geological formation evaluation for Wardie-1 commenced from the start of the 311 mm hole section at 751.0 mMDRT to the well's Total Depth at 1766.0 mMDRT. All depths given are measured depths from the Rotary Table (mMDRT).

All gas monitoring equipment was calibrated before drilling each hole section and checked regularly. Calcimetry analysis on cuttings samples was performed at the request of the Wellsite Geologists.

The lithologies encountered at Wardie-1 are described below. For a graphical display of the lithology, see Appendix 1 & 10. The lithological descriptions on the Formation Evaluation Log were provided by the wellsite geologists, with input from the BHI mudloggers.

Sampling Intervals:

751 – 770 m	19 m interval
770 – 1320 m	20 m interval
1320 – 1520 m	10 m interval
1520 – 1760 m	5 m interval
1760 – 1766 m	6 m interval

Description of Samples:

914 mm Section (76.8 – 136.0 mMDRT)
Returns to seabed. No samples.

444 mm Section (136.0 – 751.0 mMDRT)
Returns overboard from CTU deck. No samples.

311 mm Section (751.0 – 970.0 mMDRT)
751.0 to 982.0 mMDRT.

Interbedded CALCISI LTITE, CALCILUTITE, CALCARENITE and LOOSE SAND/SANDSTONE

CALCILUTITE (Trace to 10%): White to pale grey, hard, amorphous, slightly silty.
CALCISILTITE (5 to 65%): Medium grey to olive grey, occasionally black. Soft to hard, firm in places. Moderately to highly calcareous. Minor to common clastic Silt fraction. Grading to fine sand in places.

CALCARENITE (5 to 65%): Light olive grey to olive grey, white to pale yellow. Moderately hard to hard, crushed in places. Very fine to coarse. Angular to sub-angular. Translucent opaque sparry calcite. Minor Silt, minor rounded fine sand in places. Minor black lithics and glauconite. Trace shell fragments. Highly calcareous, well cemented, poor visible porosity. Common calstic Silt fraction.

LOOSE SAND/SANDSTONE (Trace to 5%): Fine to medium, trace coarse to very coarse. Moderately sorted, sub- rounded to rounded. Translucent to transparent quartz, minor orange and yellow quartz. Trace cryptocrystalline pyrite. Minor coarse to very coarse rounded clear to frosted quartz.

982.0 to 1560.0 mMDRT.

Interbedded CALCI LUTITE, CALCARENITE, CALCISILTITE, CALCAREOUS CLAYSTONE.

CALCILUTITE (5 to 100%): Light greenish grey, very light olive to medium olive grey. White to pale grey. Hard, soft to firm in part. Amorphous, sub-blocky, rare sub-fissile. Argillaceous, slightly silty, common unidentified white silty specks. Trace pyrite, glauconite. Loose foraminifera and echinoid spines. Bryozoan fragments. Grading to calcareous Claystone in places.

CALCARENITE (Trace to 10%): Light olive grey to olive grey. Minor white to pale yellow. Dark grey. Moderately hard to hard. Very fine to fine. Angular to sub-angular. Translucent to opaque sparry calcite. Minor silt, minor black lithics, grading to Calcisiltite, trace shell fragments, trace bryozoan and echinoid spines. Highly calcareous, well cemented.

CALCISILTITE (Trace to 95%): Pale to medium grey to olive grey. Dominantly firm to hard. Blocky and sub-fissile. Moderately to highly calcareous. Minor to common clastic Silt fraction. Grading in places to fine sand. Abundant microcrystalline pyrite micro laminae. Possible dolomite cement, indicated by a slower HCl reaction. Trace to very fine dark mafic grains. Rare pyrite, disseminated in places. Common dark specks of carbonaceous material. Rare blocky calcite sparry crystals.

CALCAREOUS CLAYSTONE (50 to 95%): (from 1525m) Light greenish grey to olive grey, brownish grey in places. Firm to hard. Sub-blocky and sub-fissile. Argillaceous. Moderately to highly calcareous. Fine to coarse glauconite pellets and nodules. Trace broken crystalline calcite vein material. Trace foraminifera, echinoid spines, shell fragments and pyrite. Slightly silty in places.

1560.0 to 1596.0 mMDRT

Interbedded SILTSTONE, COAL, SANDSTONE, CALCILUTITE.

CALCILUTITE (5 to 15%): Light grey and light greenish grey to grey, soft to firm, predominantly firm to hard, amorphous to blocky, argillaceous, highly calcareous, common to abundant disseminated fine glauconite pellets in part, grading to calcareous Claystone, silty.

SILTSTONE (20 to 50%): Medium brownish grey to olive grey to brown. Firm to hard. Blocky. Slightly carbonaceous. Slightly calcareous.

COAL (Trace to 70%): Dark brown to black, glossy in part along fractures. Hard. Brittle. Silty in part.

SANDSTONE (Trace to 5%): Fine to very coarse. Poorly sorted. Sub-rounded to rounded. Clear to translucent quartz. Minor glauconite. Traces pyrite aggregates. Fair inferred porosity.

1596.0 to 1714.0 mMDRT

Interbedded SANDSTONE, COAL, SILTSTONE and CLAYSTONE.

SILTSTONE (5 to 80%): Medium brownish grey to olive grey, olive black, brown, pale yellowish brown. Firm to hard, blocky and sub-fissile. Slightly carbonaceous, non to slightly calcareous, Speckled dark brown to black with carbonaceous material and laminations. Grading to very fine Sand in places. Muscovite and fine to medium sand sized glauconite.

SANDSTONE (Trace to 100%): Pale grey to brownish grey, very light grey. Clear to translucent grains. Very fine to granule (grains). Moderately to very poorly sorted. Angular to sub-rounded, rarely sub-rounded, sub-spherical in part. Trace light yellow clay, trace to minor glauconite, trace muscovite, trace pyrite, minor lithics. Inferred silica cemented, but overgrowths not confirmed. Friable to hard, common loose grains. Poor visible porosity.

COAL (Trace to 80%): Dark brown to black. Glossy in places along fractures. Hard, brittle and Silty in places.

1714.0 to 1766.0 mMDRT

SANDSTONE with minor CLAYSTONE and SILTSTONE beds
SANDSTONE (80-100%): Very light grey, white. Translucent to transparent. Fine to coarse grains. Poorly to moderately sorted. Sub-angular to sub-spherical. Trace hard aggregates with siliceous cement. Poor to good inferred porosity.

SILTSTONE (0-20%): Pale yellowish brown, speckled dark brown to black. Firm to hard. Blocky to sub-fissile. Non to slightly calcareous. Rare glauconite. Grading to very find Sand in part.

CLAYSTONE (0-5%): Dark yellowish brown, brownish grey. Firm and sub-fissile.

ROP and gas readings:

311 mm Section (751.0 –1766.0 mMDRT)

Interval (m)	ROP range (m/hr)	ROP average (m/hr)	Total Gas range (%)	Total Gas average (%)
76.8 – 136	8.7 – 74.6	40		
136 – 751	16.9 – 250.2	115.9		
751 – 970	13.8 – 167.0	54.7	0.0019 – 0.0027	0.0023
970 - 1560	15.8 – 380.0	79.7	0.0022 – 0.0813	0.0254
1560 - 1766	1.5 – 66.7	25.7	0.0038 – 1.0564	0.1358

Minimum – maximum chromatograph readings:

311 mm Section (751.0 – 1766.0 mMDRT)

Interval (m)	C1 (ppm)	C2 (ppm)	C3 (ppm)	iC4 (ppm)	nC4 (ppm)	iC5 (ppm)	nC5 (ppm)
751 – 970	2 – 7	0 – 3	0	0	0	0	0
970 – 1560	4 – 718	0 – 9	0 – 7	0 – 1	0 – 1	0	0
1560 – 1766	8 – 8576	0 – 147	0 – 66	0 – 50	0 – 39	0 – 39	0 - 21

Oil Shows

The following shows were noted in cuttings from the Latrobe Formation:

(1570-1585m) Trace to 1% pale greenish yellow pin-point fluorescence. Moderately fast to fast blooming, blue- white cut. Thin moderately bright blue green fluorescing residual ring cut fluorescence. Very faint pale tea to pale yellow brown visible residue colour.

(1585-1605m) Trace to 1 % dull pinkish orange flourescence. Slow blooming dull to moderately bright blue white cut. Very thin to thin pale blue green fluorescing residual ring cut fluorescence. No to pale yellow brown visible residue colour.

(1605-1650m) Trace to 2% dull orange yellow fluorescence. No to slow diffuse bluish white cut. No to very thin pale blue fluorescing residual ring cut fluorescence.

(1650-1660m & 1665-1670m) Trace dull yellowish orange fluorescence

Gas Peaks

Depth (mMDRT)	TG (%)	C1 (ppm)	C2 (ppm)	C3 (ppm)	iC4 (ppm)	nC4 (ppm)	iC5 (ppm)	nC5 (ppm)
1579.0	1	4000	60	70	40	30	20	10
1585.0	1	4000	40	20	10	0	0	0
1597.5	.7	4000	60	8	10	0	0	0
1615.0	.6	2500	80	10	0	0	0	0
1619.0	.4	3000	90	0	0	0	0	0
1630.0	.2	1500	50	10	0	0	0	0
1637.0	.15	600	30	0	0	0	0	0
1644.0	.15	1200	110	17	0	0	0	0
1650.0	.18	900	80	15	0	0	0	0

Normalised Gas

A “normalised” total gas curve has been plotted on the Gas Ratio Log (see Appendix 1) for comparison with the regular total gas measurement. The normalised total gas is corrected for flow rate, drilling speed and hole size in an attempt to provide a consistent measure of “actual” mud gas per unit volume that can be compared across the various drilling intervals. The equation for normalised total gas is given below:

Normalised Gas = Total gas x (Total Flow / (ROP x Bit Size^2))

Calcimetry

Calcimetry Data

Sample Depth (mMDRT)	Calcite (%)	Dolomite (%)	Total Carbonate (%)	Sample Depth (mMDRT)	Calcite (%)	Dolomite (%)	Total Carbonate (%)
770	64.2	12.2	76.4	1250	54.6	7.9	62.5
790	66.2	12.8	79.0	1270	59.4	5.8	64.9
810	67.4	12.8	80.3	1290	57.8	7.7	65.5
830	61.0	10.3	71.3	1310	41.7	727	49.5
850	70.6	9.6	80.3	1390	41.1	6.4	47.5
870	57.8	8.3	66.2	1410	25.7	5.1	30.8
890	57.8	7.7	65.5	1430	50.7	6.4	57.2
910	38.5	6.4	45.0	1450	48.8	5.8	54.6
930	59.7	12.8	72.6	1470	41.7	3.2	44.9
950	70.6	10.9	81.6	1490	35.3	2.6	37.9
970	73.9	14.8	88.6	1550	31.8	1.9	33.7
990	65.5	12.8	78.4	1570	14.8	0.6	15.4
1010	61.0	13.5	74.5	1590	19.3	0.8	20.1
1030	62.9	11.6	74.5	1610	9.3	0.6	9.9
1050	57.8	10.3	68.1	1630	9.6	0.4	10.1
1070	59.7	11.6	71.3	1650	8.3	0.5	8.9
1090	73.9	11.6	85.4	1670	6.4	0.9	7.3
1110	74.5	10.3	84.8	1690	2.4	0.3	2.7
1130	68.1	12.2	80.3	1710	3.9	0.5	4.4
1150	61.7	9.0	70.6	1730	15.6	0.2	15.8
1170	57.8	6.4	64.2	1740	18.0	1.4	19.4
1190	61.7	9.6	71.3	1760	8.5	0.1	8.6
1210	64.2	12.8	77.1	1766	7.4	0.1	7.5
1230	57.8	6.4	64.2				

MDT sampling (Pressure Sampling)

Two segregated samples were successfully recovered from a depth of 1582.4mMDRT and one sample from 1593.7mMDRT using the Schlumberger MDT tool. Single-phase transfers were performed on the three samples.

A report on the Validity Checks and Analyses of the MDT Samples is included as Attachment 12 and the fluid analyses performed by Petrotech PVT laboratory will be attached to the Wardie-1 WCR Interpretive Data.

MDT sample data

MDT FLUID SAMPLE DATA					
A. Sample Identification					
Run/seat number	Run 2 / Seat 1	Run 2 / Seat 1	Run 2 / Seat 16		
Sample depth	1582.4 mMDRT (1398.8m TVDSS)		1593.7mMDRT (1409.9m TVDSS)		
Pretest volume	20 cc	-	20.4 cc		
Chamber size	450 cc	450 cc	450 cc		
Chamber serial number	#3349	#3300	#3454		
Probe type	Large	Large	Large		
Choke size	N/A				
B. Sampling History					
Date	20-May-08	20-May-08	20-May-08		
Initial hydrostatic	2373.26 psia	-	2389.02 psia		
Tool Set	10:46 hrs	-	17:43		
Pretest start	10:46 hrs	-	17:46		
Initial formation pressure (pre	1983.33 psia	-	1981.9		
Pretest end	11:02	-	17:52		
Pretest duration	*6'00"*	-	*6'4"*		
Pumpout start	11:13	11:54	17:42		
Pumpout end	11:49	12:06	18:07		
Pumpout duration	*33'44"*	*12'07"*	*15'40"*		
Pumpout volume	9.70 litres	5.335 litres	4.365 litres		
OFA indication	Green	Green	Green/Blue		
Interpreted fluid at OFA	Oil	Oil	Oil/Filtrate		
Maximum resisitivity at probe	ohm-m				
Chamber open	11:49	12:06	18:07		
Minimum sampling pressure	920.15psia	899.08psia	239.8 psia		
Final formation pressure	N/A	1982.0 psia	N/A		
Chamber sealing pressure	1929.7 psia				
Seal chamber	11:54	12:09	18:15		
Chamber fill time	*4'57"*	*3'06"*	*8'04"*		
Tool retract	N/A	12:31	18:24		
Final hydrostatic	-	2371.56 psia	2371.5 psia		
Total time	-	*1hr55'*	*41'*		
C. Sample Downhole Temperature And Resistivity					
At sample depth (AMS)	52.2 degC	53.4 degC	56.2 degC		
Rm@sample depth (AMS)	0.063ohm-m	0.062ohm-m	0.060ohm-m		
D. Sample Recovery At Surface					
Surface opening pressure	3850 psig	1100 psig	0? psig		
Volume gas	cuft				
Volume oil/condensate	0.300 litres	0.380 litres		(Total volume of all Fluids combined)	
Volume water/filtrate	litres		0.380 litres		
E. Mud Filtrate Properties					
Rmud @ degC	0.112ohm-m@20.2degC				
K+ ion calculated from KCl%	- mg/l				
Chlorides titrated	38,000 mg/l				
pH	9				
Tritium	N/A DPM				
F. General Calibration					
Reported mud weight	9.33 ppg				
Calculated hydrostatic	*2287 psia*		*2304.6 psia*		

MDT Pressure point data

Wardie-1 - MDT PRESSURE POINT & SAMPLING PROGRAMME

sampling points
LFA FLUID CONFIRMATION
pressure test point

Pressure Point #	Actual Depth mMDRT	Actual Depth mTVDRT	Actual Depth mTVDSS	Depth ftTVDSS	Time Pad Set	CQG Initial Hydrostatic Pressure psia	CQG Final Hydrostatic Pressure psia	Drawdown Volume cc	CQG Flowing Pressure psia	CQG Final Buildup Pressure psia	strain Final Buildup Pressure psig	PTA standard cylindrical mtd Mobility md/cp	Temp. deg C	Remarks
1	1582.4	1437.1	1399.1	4590.45	10:46				900.00	1981.61	1970.88		55.0	went straight to pump-out; attempted pressure determination after, but not fully stabilised
1	1582.4	1437.1	1399.1	4590.45	12:15		2371.56	10.0		1982.00	1971.39	6.6	53.5	
2	1584.0	1438.3	1400.6	4595.37	12:46	2378.99	2371.63	10.0	1700.00	1984.20	1973.37	233.9	52.8	
3	1581.0	1435.4	1397.7	4585.85	13:19	2369.25	2369.30	10.1		2024.33	2013.30	1.3	53.1	supercharged - stable buildup pressure not obtainable
4	1574.5	1429.0	1391.3	4564.86	13:29	2358.75		3.6		1994.11	1982.99		53.1	supercharged
5	1574.0	1428.5	1390.8	4563.21	13:37	2358.20		10.1		1991.49	1980.54		53.0	supercharged; after pumpout, aborted buildup at 1986.6 not stabilised.
6	1573.8	1428.3	1390.6	4562.56	14:43	2357.82	2357.81	6.8		1989.97	1978.49		54.7	supercharged
7	1578.4	1432.8	1395.1	4577.32	14:59	2365.17		10.1					54.5	supercharged
8	1591.4	1445.6	1407.9	4619.32	15:26	2385.58		10.1					55.0	
9	1593.5	1447.6	1409.9	4625.88	15:34	2388.70		3.5					54.7	
10	1602.0	1456.0	1418.3	4653.44	15:50	2402.82	2402.95	10.0		1986.86	1975.90	12.3	54.8	valid test
11	1609.0	1462.9	1425.2	4676.08	16:04	2414.32	2414.40	10.0		1991.06	1980.21	34.7	55.2	valid test
12	1613.5	1467.3	1429.6	4690.52	16:20	2421.55	2421.64	10.1		1996.45	1985.47	17.1	55.2	valid test
13	1624.0	1477.7	1440.0	4724.64	16:41	2438.68	2438.78	10.1		2012.74	2001.74	3155.9	56.5	valid test
14	1656.5	1509.8	1472.1	4829.80	16:57	2491.75	2491.82	10.1		2064.45	2053.57	92.8	55.7	valid test
15	1681.5	1534.5	1496.8	4910.90	17:12	2533.00	2533.02	10.2		2101.91	2091.13	246.1	56.1	valid test
16	1593.7	1447.8	1410.1	4626.54	17:41	2389.02	2371.53	10.0		1981.85	1970.60	574.0	56.2	valid test
17	1580.9	1435.3	1397.6	4585.53	18:49	2366.70		10.0					56.4	tight, or probe blocked?
18	1580.7	1435.1	1397.4	4584.87	19:06	2367.76	2367.84	6.3					55.3	tight, or probe blocked?

Conventional Cores

No conventional cores were cut in Wardie 1.

Percussion Sidewall Cores

No percussion sidewall cores were acquired in Wardie 1.

Logging While Drilling (LWD)

MWD/LWD services were provided by Schlumberger and full details of their operation are recorded in their End of Well Report included herein as Enclosure 4. LWD operations are briefly summarised below.

LWD Run Summary 1

To be filled in at the end of each run by the LWD Engineer and verified by the Well Site Geologist

General Data							
Well Name	Wardie-1	**MWD Run#**	1	**Date**	12-May-2008	to	13-May-2008
Service Company	Schlumberger D&M	**BHA#**	2	**Drilled Interval**	136m MDRT	to	751m MDRT
UWI				**Wiped Interval**	N/A	to	
Engineers	**Anagh Kohli, S Aung**						

Hole Data									
Hole Size	17.5 in	**Inc Start**	0.97°	**Inc End**	34.35°	**Azi Start**	331.19°	**Azi End**	239.86°

Mud Data							
Mud type	Seawater with PHG sweeps	**Mud Weight sg**	1.06	**PV / YP**	24 / 103	**Cl mg/l**	-
% HG Solids	1.2	**K+ mg/l**	-	**Rmf**	-	**Rm**	-

Drilling Data							
Metres Drilled	615	**Avg ROP m/hr**	91.79	**Avg WOB klb**	19	**Avg Torque kftlb**	1-5
RPM	45-100	**Flow Rate GPM**	600-1150	**SPP psi**	650-2575	**BHCT**	21-23°C

Bit Data							
Make	Hughes Christensen	**Type**	Milled Tooth	**Depth In**	136m	**Depth Out**	751m
Number Jets	3	**Sizes**	20/32”	**Condition Out**		1-1-NO-A-E-I-NO-TD	

BHA Data														
BHA Item	Bit	Mud Motor	String Stab	Cross Over	Float Sub	NM Pony Collars	Cross Over	MWD	NM Drill Collars	Drill Collars	Jar	Drill Collars	Cross Over	HWDP
OD (in)	8.75	9.63	9.50	9.50	8.00	7.94	8.50	8.25	8.00	8.00	8.00	8.00	8.25	5.50
ID (in)	3.75	7.88	3.00	3.00	2.88	2.88	2.88	5.90	2.81	2.81	3.00	2.81	2.81	3.25
Length (m)	0.41	10.10	2.42	1.23	0.80	7.00	0.47	8.49	18.96	37.63	9.68	18.89	1.22	112.71
Total (m)	0.41	10.51	12.93	14.16	14.96	21.96	22.43	30.92	49.88	87.51	97.19	116.08	117.30	230.01

MWD / LWD Tool Data				
Tool Type	**TeleSCOPE**			
Sub Type	**MWD**			
Tool OD / ID (in)	OD=8.25 ID=N/A			
Mem Sample Rate (sec)	N/A			
Bit to Sensor Offset (m)	26.56			
First Reading (m)	N/A			
Flow Rate Range for Pulser Configuration			600-1200 GPM	

Data Acquisition				
	Pressure	**Gamma**	**Resistivity**	
Interval Logged (m)	N/A	N/A	N/A	
Meters Logged, %				
Meters Bad Data / Interval, %				
Meters No Data / % Interval (m)				

Density Calibration (Calibration filename format = ADN, Size, S/N, Date mmddyy, Time hhmm)	
Pre Run Calibration file	N/A
Post Run Calibration file	N/A
Comments	LWD tools not run

MWD/LWD Time Analysis					
Date & Time In	12/05/08 19:30 hrs	**Drilling time**	13 (6.7 on bottom)	**% Total**	44.0 (23.9)
Date & Time Out	13/05/08 23:30 hrs	**Wiping Time**	0	**% Total**	0
Time In Hole (hrs)	28.0	**Tripping Time**	13 (16.1)	**% Total**	44.0 (57.5)
Pumping time (hrs)	11.9	**Down Time / Other**	2 (0)	**% Total**	6.9 (0)
		Circ Time	1.5 (5.2)	**% Total**	5.1 (18.6)

Remarks: D&I run only. Objective was to kick the well off and stop in the tangent section. No MWD GR or LWD tools were run in the string. The run was successful. At the end of the run the actual well path was 1.5m to the right and 2.5m above the proposed line. Centre to centre was 2.21m at 751 mMDRT (706.8 mTVDRT). Note – IADC times given in centre time analysis column. Times in parentheses are from DD breakdown. “Other” time is for Gyro survey.

LWD Run Summary 2

To be filled in at the end of each run by the LWD Engineer and verified by the Well Site Geologist

General Data

Well Name	Wardie-1	**MWD Run#**	2	**Date**	16-May-2008	to	20-May-2008
Service Company	Schlumberger D&M	**BHA#**	3	**Drilled Interval**	751m MDRT	to	1766m MDRT
UWI				**Wiped Interval**	N/A	to	
Engineers	**Anagh Kohli, S Aung**						

Hole Data

Hole Size	311mm / 12¼"	**Inc Start**	32.02°	**Inc End**	7.36°	**Azi Start**	241.09°	**Azi End**	234.18°

Mud Data

Mud type	KCl Polymer WBM	**Mud Weight sg**	1.07 – 1.13	**PV / YP**	13 / 30	**Cl mg/l**	33,000 – 38,000
% HG Solids	0.1-0.5 %	**K+ mg/l**	43, 000	**Rmf**	0.1168 ohm-m - 15.9°C	**Rm**	0.1222 ohm-m - 16.0°C

Drilling Data

Metres Drilled	1015	**Avg ROP m/hr**	52.3	**Avg WOB klb**	20	**Avg Torque kftlb**	8.84
RPM	79-241 (156)	**Flow Rate GPM**	960-1125 (1105)	**SPP psi**	1219-2186 (1811)	**BHCT**	50.2°C

Bit Data

Make	Hycalog	**Type**	PDC	**Depth In**	751m	**Depth Out**	1766 m
Number Jets	6	**Sizes**	15,15,15,16,16,16	**Condition Out**		3-3-WT-A-X-I-CT-TD	

BHA Data

BHA Item	Bit	RSS BU	RSS	LWM	MWD	Drill Collars	Drill Collar	JAR	Drill Collars	XO	HWDP
OD (in)	12.25	9.25	9.25	8.25	8.25	8	8	8	8	8	5.5
ID (in)	3.25	3	6	3.9	5.9	2.8	2.8	3	2.8	2.81	3.25
Length (m)	0.3	4.22	4.82	4.22	8.49	8.65	9.45	9.68	9.44	1.22	112.71
Total (m)	0.3	4.52	9.34	13.56	22.05	30.7	40.15	49.83	59.27	60.49	173.2

MWD / LWD Tool Data

Tool Type	**RAB 8**	**RAB 8**	**RAB 8**	**RAB 8**	**RAB 8**	**TeleSCOPE**
Sub Type	**Gamma**	**Resistivity**	**Resistivity**	**Resistivity**	**Resistivity**	**MWD**
Tool OD / ID (in)	8.25 / 3.90					8.25 / 5.9
Mem Sample Rate (sec)	5 sec	5 sec	5 sec	5 sec	5 sec	N/A
Bit to Sensor Offset (m)	10.51	Shallow=11.28	Medium=11.15	Deep=10.98	Ring=10.77	Survey=17.68
First Reading (m)	747	747	747	747	747	802.8
Flow Rate Range for Pulser Configuration				600-1200 GPM		

Data Acquisition				
	Pressure	**Gamma**	**Resistivity**	
Interval Logged (m)	N/A	747.0 - 1756.2	747.0 - 1756.0 (Ring)	
Meters Logged, %	N/A	1009.2 / 99.9	1009 / 99.9	
Meters Bad Data / Interval, %	N/A	0	0	
Meters No Data / % Interval (m)	N/A	10.5 / 0.1	10.7 / 0.1	

Density Calibration	(Calibration filename format = ADN, Size, S/N, Date mmddyy, Time hhmm)
Pre Run Calibration file	N/A
Post Run Calibration file	N/A
Comments	ADN tool not run.

MWD/LWD Time Analysis					
Date & Time In	16/05/08 14:00 hrs	**Drilling time**[1]	35.5 (19.4)	**% Total**	41.3 (23.5)
Date & Time Out	20/05/08 00:30 hrs	**Wiping Time**	0 (7.25)	**% Total**	0 (8.8)
Time In Hole (hrs)	82.5	**Tripping Time**	30.0 (30.35)	**% Total**	34.9 (36.8)
Pumping time (hrs)	44.9	**Down Time / Other**	5.0 / 7.5	**% Total**	5.8 / 8.7
		Circ Time	8.0 (25.5)	**% Total**	9.3 (30.9)

Remarks: The objective of this run was to continue the tangent section and drop angle through the target horizons to TD. At TD the centre-to-centre distance from the actual well path to the plan was 2.19m. The quality of both real time and memory logs was good (ROP was controlled at 30m/hr maximum through the target to ensure good RT data was available). RT log quality was sufficient for well correlation and first indications of possible pay zones. No intervals of bad or missing data were present.

Times in parentheses in the LWD Time Analysis are from the DD, including actual on bottom drilling hours. The remaining times are taken from the DDR breakdown. All "Down Time" is rig related repairs, not LWD related. "Other" time includes the FIT and washing/drilling on cement

[1].

Wireline logging

Wireline services were provided by Schlumberger and full details of their operation are recorded in their End of Well Report included herein as Enclosure 5.

A single open hole logging suite (Suite 1) was recorded in Wardie 1. Suite- 1 was recorded across the 311mm (12 1/4") open hole section and consisted of two attempted logging runs.

Schlumberger wireline logging operations and summary of parameters:

Date	20/May/08												
Log Run Number (Suite / Run):	1	/	1										
Surface Temperature	10°C												
Depth Driller:	1766	metres											
Depth Logger:	1760	metres											
Bottom Log Interval:	1760	metres											
Top Log Interval:	1300	metres											
Casing Driller:	747	metres				Size:	13⅜"	Weight:	68 lbs/ft	ID:	12.415		
Casing Logger:	746.5	metres											
Bit Size	12.25	"											
Type of Fluid in Hole	KCl/PHPA												
Density	9.5	ppg				x	Barite		Hematite	x	Other (Salt)		
Viscosity	56					Titrated Chlorides	38,000	Nitrates					
pH	9					Titrated Calcium	400	Potassium					
Fluid Loss	11.6	HPHT				Barite	0.1	%	Oil / Water Ratio				
Source of Sample	Flowline					Use a circulated mud sample for each analysis.							
Rm	0.112	@	20.2	°C									
Rmf	0.099	@	19.8	°C		0.0901	@ 23.9°C (75°F)						
Rmc	0.13	@	20.7	°C									

Log	Track	Scale Range			Comments (units, line codes, etc.)
GR	1	0		150	
SP					n/a
Caliper	1	10		20	Appropriate 10" range
Bit Size	1	6		16	Appropriate 10" range
Resistivity	2	0.2		200	
Density	3	1.65		2.65	
Correction	3	-0.9		0.1	
Pe	3	0		20	
Neutron	3	60		0	
Sonic	3	240		40	
Tension	Depth	10,000		0	

Drill stem testing

No DST was run in Wardie 1.

Biostratigraphy

No palynology samples collected.

ATTACHMENTS

Attachment 1: Well Montage

Attachment 2: Bit and BHA Record

Attachment 3: Mud Report

Attachment 4: Casing Report

Attachment 5: Cementing Report

Attachment 6: LOT/FIT Report

Attachment 7: Directional Drilling Report

Attachment 8: Activity Summary Reports

Attachment 9: Well Cost Summary

Attachment 10: Description of Cuttings

Attachment 11: Daily geological Reports

Attachment 12: Validity checks and analyses of MDT Samples

Attachment 13: PVT Report

LIST OF ENCLOSURES

Enclosure 1: Gas Log Plot

Enclosure 2: Drilling Data Plot

Enclosure 3: Mud Log Plot

Enclosure 4: LWD Log Plot

Enclosure 5: Wireline Log Plot

Attachment 1

Well Montage

Attachment 2

Bit and BHA Record

Attachment 3

Mud Report

Attachment 4

Casing Report

Attachment 5

Cementing Report

Attachment 6

LOT/FIT Report

Attachment 7

Directional Drilling Report

Attachment 8

Activity Summary Reports

Attachment 9

Well Cost Summary

Attachment 10

Description of Cuttings

Attachment 11

Daily Geological Reports

Attachment 12

Validity Checks and Analyses of MDT Samples

Attachment 13

Validity Checks and Analyses of MDT Samples

Enclosure 1

Gas Log Plot

1:500

Enclosure 2

Drilling Data Plot
1:1000

Enclosure 3

Mud Log Plot
1:500

Enclosure 4

LWD Log Plot
1:500

Enclosure 5

Wireline Log Plot
1:500