



# **HALIBUT A-6A**

## **FINAL WELL REPORT**

Prepared by

**Geoservices Overseas S.A.**

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DRILLING LOG --	1:1000 scale from 550 to 3473.5 metres
GAS RATIO LOG --	1:500 scale from 3100 to 3473.5 metres

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## **Section 1**

### **General Well Summary**

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**WELL DATA**

Operator : Esso Australia Ltd  
Platform : Halibut  
Well name : Halibut A-6A  
Country : Australia  
Location : Gippsland Basin  
Structure : Faulted Anticline  
Field : Halibut  
Permit : Vic/L11

Location AMG co-ordinates : 5 748 517.760m N 615 270.615m E

Location local co-ordinates : Lat: 38° 24' 14.919" S Long: 148° 19' 12.515" E

Surface co-ordinates : -1.34 N 6.249 E

Profile : Deviated  
Reference depth : Rotary Table  
RT to Seabed : 102.45 metres  
RT above M.S.L. : 29.45 metres  
Sea-water depth : 73.00 metres  
Proposed total depth : 3461.0 metres  
Actual total depth : 3473.5 metres  
True vertical depth : 2456.67 metres  
Spudded on : 14th December 2003  
Total depth reached on : 24th December 2003

**Drilling Contractor**

Drilling Contractor : NABORS ISDL  
Rig name : 453  
Rig type : Platform

**Drilling Phases**

Diameter (inch)	From (mMDRT )	To (mMDRT )	Mud Type
8-1/2"	549.5.0	3473.5	KCl / Glycol / PHPA

**Cased Hole**

Casing Diameter (inch)	Casing Type	Shoe Depth (mMDRT )
20"	Conductor	178.0
10-3/4"	Surface	549.5
7"	Production	3466.45

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**MUD LOGGING**

Logging Unit Number: 137

Engineers: R. Pereira, P. Rady, M. Boyd, M. Smith.

**Sampling Interval****Halibut A-6A**

Sample Type	Number of sets	Quantity per set	Sampling interval	From (m)	To (m)
Washed and Dried	3	100 grams	10 metres	3020	3120
Washed and Dried	3	100 grams	5 metres	3120	3473.5

**Cuttings Distribution**

Company	Washed and Dried Sample Set
Esso Australia	1
Victorian Department of Energy and Minerals	1
Australian Bureau of Resources	1

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## WELL SUMMARY

Halibut A-6A is an infill directional well designed to intersect the TCC primary target and the secondary targets, M162 and TD zones. The well was drilled to a total depth of 3473.5 mMDRT (2456.7 mTVDRT) in an 8½" production hole.

Halibut A-6A was completed as a single oil completion string with 3½" tubing in 7" production casing. Halibut A-6A was handed over to production on the 4th January 2004 at 2400 hrs.

Halibut A-6A was spudded at 21:30 hours on the 14th of December 2003 after setting a kick off plug from 630 m to 489 mMDRT.

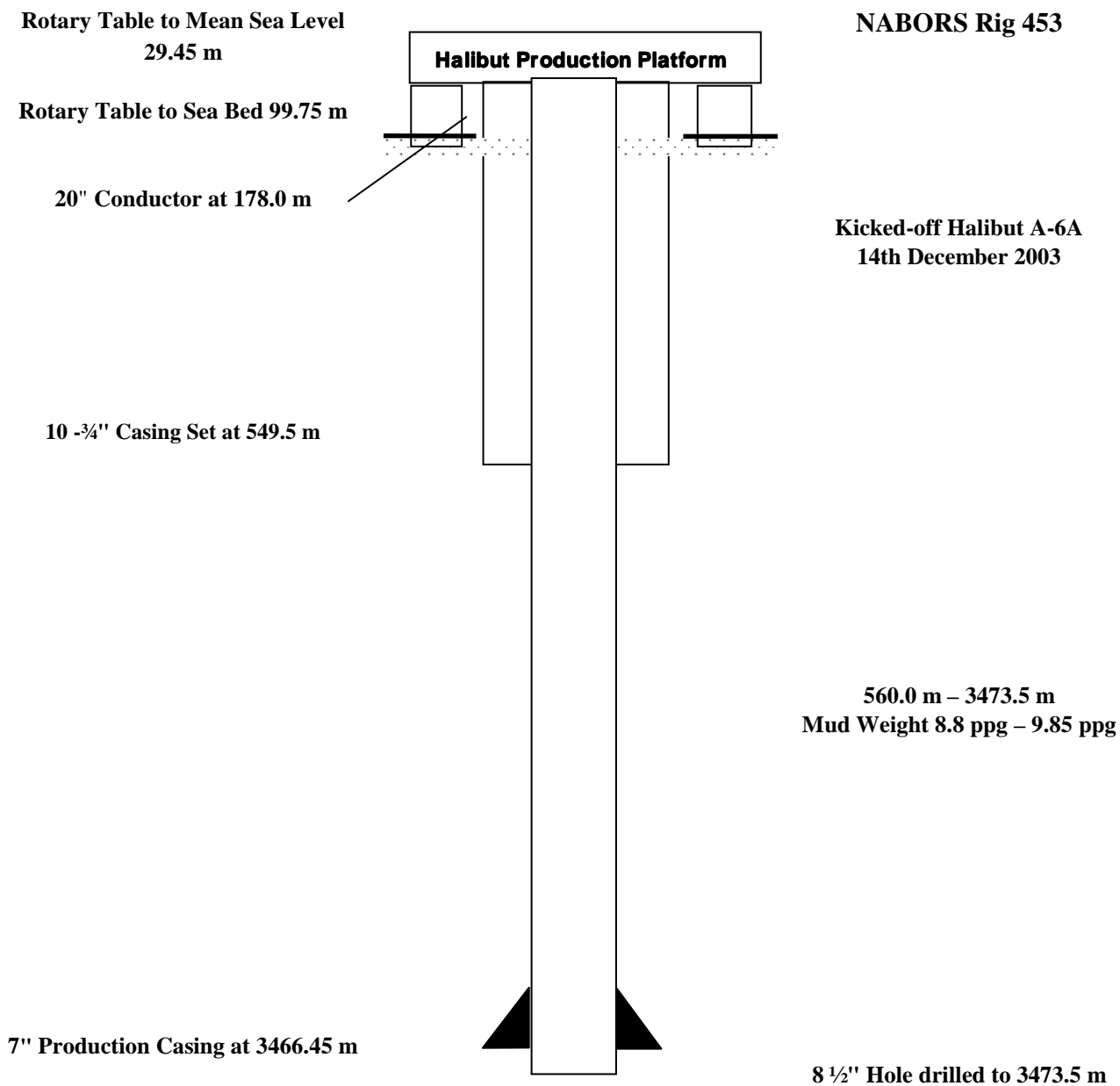
A steerable / MWD assembly with an 8½" Smith S75HPX bit was used to kick off from the 10-¾" casing shoe at a depth of 549.5 mMDRT. When cement returns had dropped off to below 80% at 577 mMDRT, a Pressure Integrity Test (290 psi: 12.0 ppg EMW) was carried out with 9.0 ppg mud. The hole was then drilled to a depth of 3124 mMDRT where a wiper trip was conducted to the 10-¾" surface casing shoe, before drilling ahead to total depth. Halibut A-6A reached the total depth at 15:30 hours on the 24th December 2003. The final survey at a depth of 3450.21 mMDRT had an inclination of 63.19° and an azimuth of 126.50°.

A wiper trip was made to the 10-¾" casing shoe prior to pulling out of the hole and running the Reeves shuttle conveyed memory logging system.

Throughout the Halibut A-6A drilling programme, there was no problematic tight hole / loses / gains encountered on any trip, or whilst drilling.

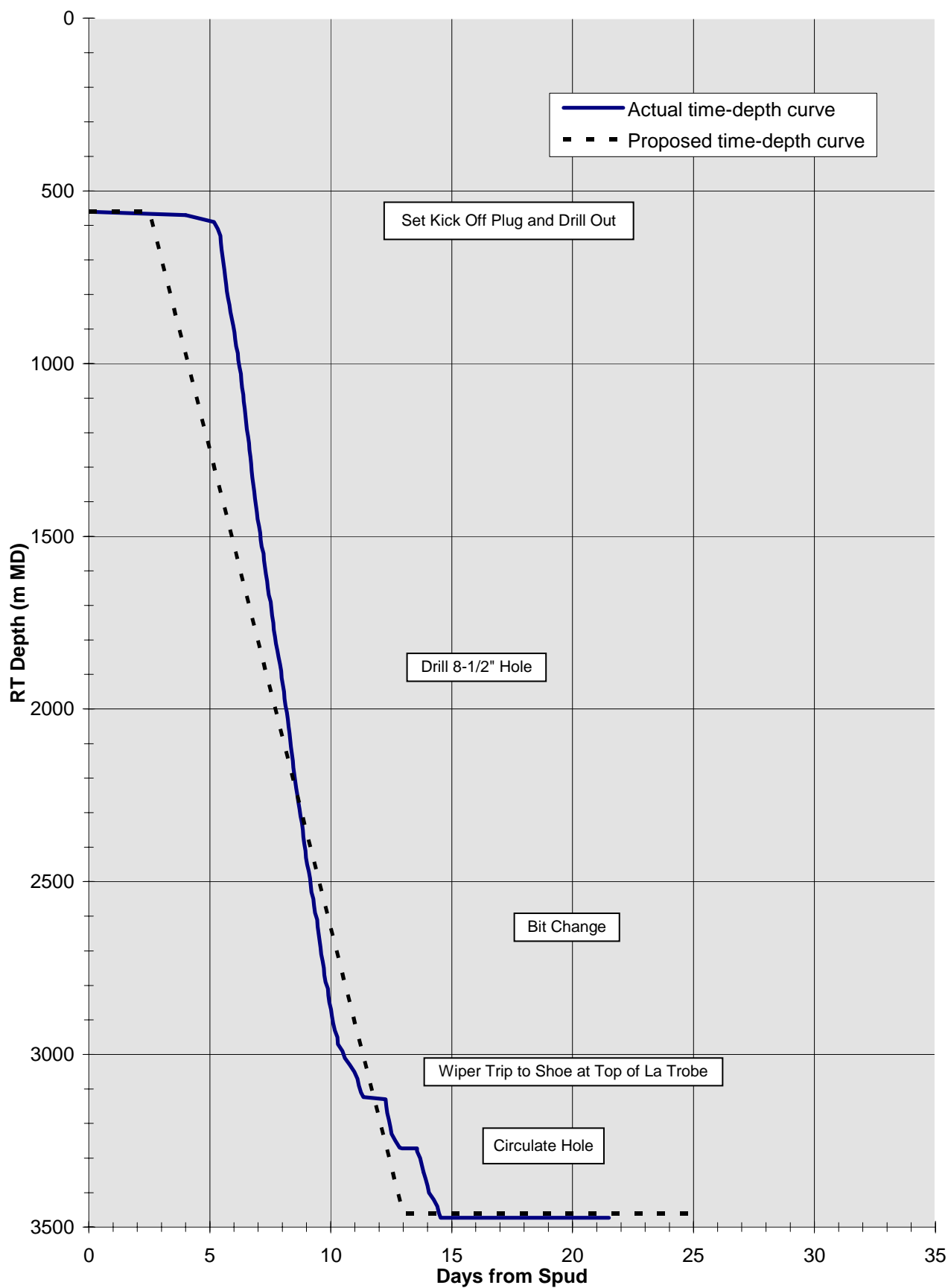
After drilling out cement with seawater, the hole was displaced to mud with an initial mud weight of 9.0 ppg prior to performing the PIT. A KCl / Polymer mud system was used for initial displacement during kick off from 549.5 mMDRT. Once out of cement and drilling new formation, PHPA, Glycol and Baracor-129 were added to the mud system to maintain mud rheology as per programmed concentrations. This mud weight was maintained until 2327.0 mMDRT where it was gradually increased from 9.3 ppg to 9.6 ppg with Barite additions prior to drilling the Lakes Entrance formation. Baracarb 25 and 100 were added at 2672.0 mMDRT as per programmed concentrations to bridge the pore throats and reduce the likelihood of differential sticking and seepage losses through the Latrobe Formation. Throughout the target sections to total depth, the mud weight was increased gradually from 9.6 ppg to 9.8 ppg. Volumes and mud properties were maintained throughout with premix additions.

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**WELL PROFILE**

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### TIME-DEPTH CURVE (measured depth)



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**BIT RUN SUMMARY**

Bit	Size (")	Type	Jets	In (m)	Out (m)	Hours	Condition
1	8½	Smith S75HPX	7 x 20	549.5	3473.5	130.5	1-1-WT-A-X-IN-PN-TD

**CASING DATA**

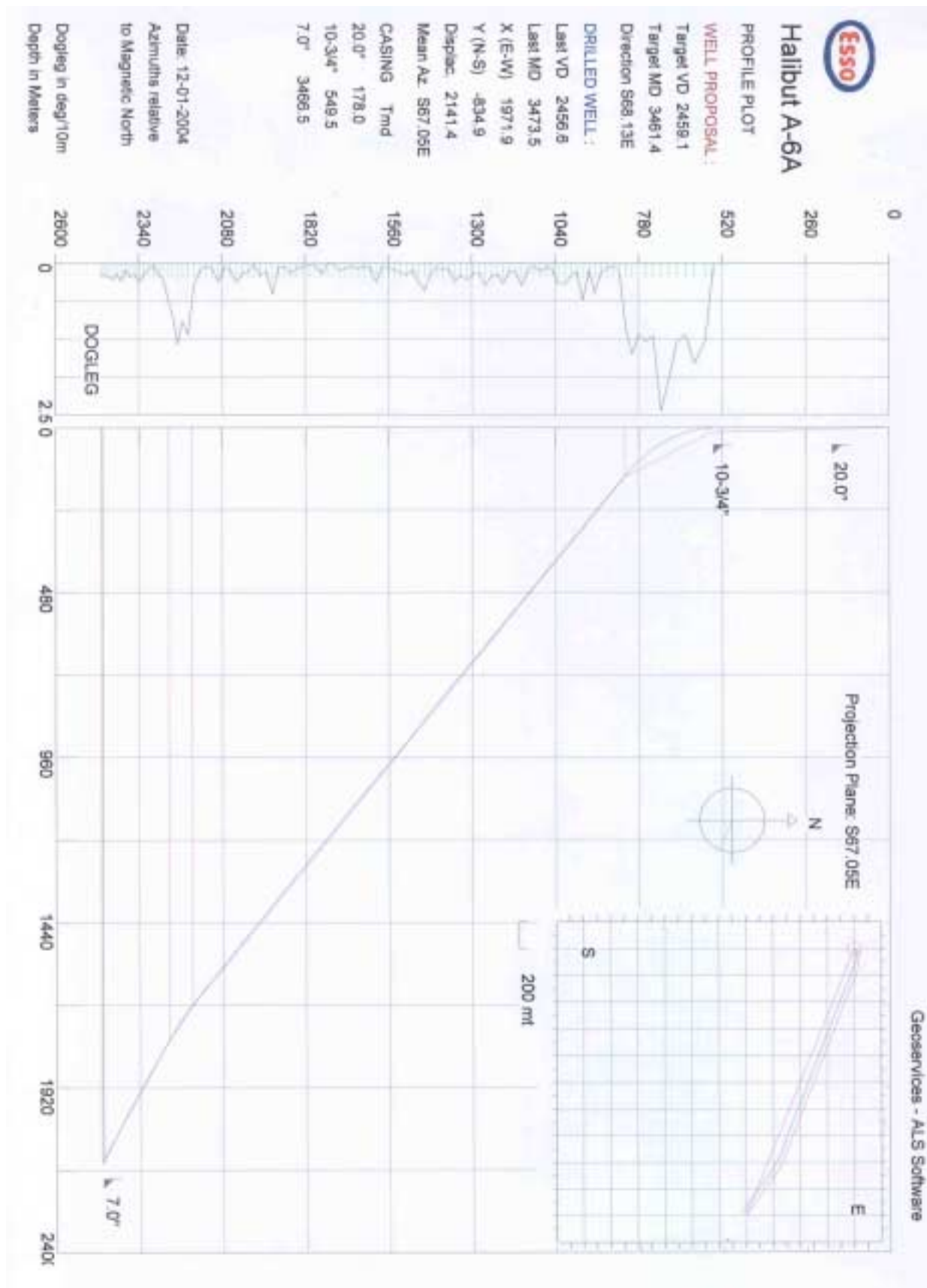
Type	Size (Inches)	Weight (lb/ft)	Grade	Thread	Depth (mMDRT)
Conductor	20	133	K-55	BTC	178.0
Surface	10 <sup>-3</sup> / <sub>4</sub>	45	J-55	BTC	549.5
Production	7	26	L-80	LTC	3466.45

**CEMENTING DATA**

Casing Details	Cement Type	Dry Cement Volume (sx)	Cement Additives	Mix Water (bbls)	Slurry Volume (bbls)	Slurry Density (ppg)	Cement To / From (mMDRT)	Casing Pressure Test (psi)
7"	HTB	723	HALAD 413L 32 gal / 10 bbls  SCR-100L 2 gal / 10 bbls  CFR-3L 5 gal / 10 bbls  NF-5 0.25 gal / 10 bbls	81	145	15.8	2602.9 m 3466.45 m	2500 psi

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## WELL DIRECTIONAL PROFILE



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**WELL DIARY**

- 10th December 2003** Skid rig to Halibut A-6. Rig up over Halibut A-6A.
- 11th December 2003** Rig up on Halibut A-6. Dress LPRs to 4" solids and install test stump to BOPs. Change UPRs to 7<sup>5</sup>/<sub>8</sub>" solids. Pressure test blind rams 300/3000 psi for 5 minutes. Pressure test annulus, choke manifold, kill and standpipe 300/3000 psi for 5 minutes. Remove test stump. Cameron remove abandonment flange. Remove excess equipment from wellhead area and rig up deluge system. Nipple up riser, BOPs, bell nipple and return lines. Function test all remote panels.
- 12th December 2003** Make up test assembly and seat same. Rig up Howco. Test LPR's to 300/2500 psi for 5 mins, ok. Break down test assembly. Rig service. Make up 7<sup>5</sup>/<sub>8</sub>" casing cutter, function test same and run in hole to 587 m. Locate collar and space out string to 594m. Cut casing. Circulate hole clean at 594 m via choke manifold. Flow check – ok. Pull out of hole from 594m to surface. Break down and lay down casing cutter assembly. Make up spear assembly as per Baker. Run in hole to 14 m, latch onto casing and pull free with 85 k. Pull out of hole to casing stump. Cameron remove casing slips, rig up Weatherford handling gear. Release spear and lay out same, break and lay out casing stump. Pull out of hole from 583 m to 571 m. Excessive 'U' tubing. Circulate well system. Pull out of hole and lay down casing from 571 m to surface. Break connections with rig tongs due to high torque. Rig down Weatherford, pick up and break down spear assembly, FOBV and crossovers. Run in hole with 4" DP to 594 m. Circulate prior to entering casing stub.
- 13th December 2003** Change out sub annulus valve on 'A' section. Work string from 594 m to 595.5 m and attempt to enter 7<sup>5</sup>/<sub>8</sub>" casing stump, no go. Flow check - static. Pull out of hole from 595 m to 544 m. Circulate hole clean due to excess 'U' tube effect. Flow check – static. Pull out of hole from 544 m. Make up 3<sup>1</sup>/<sub>2</sub>" mule shoe and crossover to 4" drill pipe. Run in hole to obstruction at 620 m. Work string and attempt to pass obstruction – no go. Pull out of hole from 620m to 585 m. Run in hole from 585 m to obstruction at 620 m. Work string and attempt to pass obstruction – no go, whilst circulating hole clean. Flow check – ok. Pull out of hole from 620 m to mule shoe. Break and lay out same. Howco install centralizers to 2 of 4" drill pipes and run in hole to 631 m. Pull out of hole from 631 m to 622 m. Conduct space out and run in hole to 630 m. Circulate hole clean at 630 m. Howco install dart and CST, displace same with rig pumps. Pull out of hole from 630 m to 625 m, make up cement assembly and high pressure lines. Howco test lines, mix and pump cement, inconsistent cement weights. Rig to and forward circulate cement out of hole via 'A' section with rig pumps. Rig to and reverse circulate 1<sup>1</sup>/<sub>2</sub> times string volume. Rig to and test lines – ok. Howco mix and pump cement as per program, displace with 16 bbls seawater. Pull out of hole from 625 m to 488 m. Rig to and reverse circulate 2 times string volume, cement returns to surface. Pull out of hole from 488 m to 430 m. Wait on cement.
- 14th December 2003** Run in hole from 430 m and tag cement at 489 m. Pull out of hole from 489 m to 459 m. Make up test assembly and high pressure lines. Test same – ok. Howco test casing 150/1500 psi for 15 minutes – ok. Break down test assembly. Conduct rig service. Pull out of hole from 459 m to surface. Remove Howco centralizers. Clear rig floor of excess equipment. Change out surface annulus valve on 'A' section. (Change to Halibut A-6A at 05:00 hrs). Make up test assembly and seat same in well head profile. Rig up high pressure lines. Howco test lines – ok. Howco test UPRs 300/3000 psi for 5 minutes – ok. Break down test assembly, rig to and Howco test sub annulus valve 300/1500 psi – ok. Rig to and run wear bushing. Break down running tool. Make up 8<sup>1</sup>/<sub>2</sub>" steerable assembly as per Anadrill, shallow test, set bend 1.5° and run in hole to 143 m. Change out jar. Run in hole with 4" DP from 143 m to 458 m. Slip and cut 80' drilling line. Rig service. Wash from 458 m to top of cement at 489 m. Drill cement from 489 m to 560 m.

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- 15th December 2003** Drill cement from 560m to new formation at 577 m. Circulate hole clean whilst pulling out of hole from 577 m to 549 m. Make up test assembly and surface lines. Howco conduct PIT to 30 psi (EMW = 12 ppg), rig down test assembly. Run in hole from 549 m to 577 m and drill and steer from 577 m to 600 m. Rig to and run in hole with SDI Gyro tool to 570 m and pull out of hole and rig down same. Drill, steer and survey 8½" hole from 600 m to 889.5 m.
- 16th December 2003** Drill, steer and survey 8½" hole from 889.5 m to 1435 m.
- 17th December 2003** Drill, steer and survey 8½" hole from 1435 m to 1894 m.
- 18th December 2003** Drill, steer and survey 8½" hole from 1894 m to 2411 m.
- 19th December 2003** Drill, steer and survey 8½" hole from 2411 m to 2848 m.
- 20th December 2003** Drill, steer and survey 8½" hole from 2848 m to 2957 m and work string and circulate whilst changing out shaker screen. Drill, steer and survey 8½" hole from 2957 m to 2999 m and work string and circulate whilst work on mud pump #2. Drill, steer and survey 8½" hole from 2999 m to 3010 m, rack back 1 stand per ½ hour from 3010 m to 2954 m whilst working on mud pump #2. Wash and ream from 2954 m to 3010 m and drill, steer and survey 8½" hole from 3010 m to 3036 m.
- 21st December 2003** Drill, steer and survey 8½" hole from 3036 m to 3072 m. Change damaged shaker screens and drill from 3072 m to 3081 m. Drill, steer and survey from 3081 m to 3100 m. Change out shaker screens and drill from 3100 m to 3124 m. Rotate, work string and rack back 1 stand every ½ hr from 3124 m to 2955 m, whilst circulating hole clean. Flow check – static, pump slug. Pull out of hole from 2955 m to 548 m. Run in hole from 548 m.
- 22nd December 2003** Run in hole from 549 m to tight spot at 2890 m. Wash from 2890 m to 2918 m. Run in hole from 2918 m to 3072 m. Precautionary wash and ream to bottom. Drill, steer and survey 8½" hole from 3124 m to 3223 m. Rotate and work string while changing out swab in mud pump. Drill, steer and survey 8½" hole from 3223 m to 3253 m. Rotate and work string while changing out swab in mud pump. Drill, steer and survey 8½" hole from 3253 m to 3272 m. Rotate and work string.
- 23rd December 2003** Circulate and reciprocate pipe from 3272 m to 2842 m, whilst carrying out rig repairs. Run in hole from 2842 m to 3272 m, wash last two stands to bottom. Drill, steer and survey 8½" hole from 3272 m to 3301 m. Rotate and work string to reduce high gas. Drill, steer and survey 8½" hole from 3301 m to 3358 m.
- 24th December 2003** Drill, rotate and survey 8½" hole from 3358 m to 3473.5 m. Circulate and work string while cleaning hole from 3473.5 m to 3416 m. Back ream from 3416 m to 3100 m.
- 25th December 2003** Pump and circulate sweep at 3100 m. Pull out of hole to shoe and circulated sweep. Pull into shoe and cut and slip drilling line. Run in hole to 3416 m and precautionary wash to bottom. Circulate hole clean and pump sweep, while racking back from 3473.5 m to 3330 m. Flow check, pump sweep, circulate and pump slug. Pull out of hole from 3330 m to 1200 m.
- 26th December 2003** Continue to pull out of hole to 602 m. Flow check, circulate and pump sweep. Pull out to BHA and lay out pony NMDC; set mud motor bend to 0°; flush motor and MWD. Rack back BHA and clear rig floor for logging. Make up BHA and HWDP to 67 m. Make up logging tools and load radioactive source. Continue to make up BHA to 237 m and run in hole on 4" DP to bottom. Pull back and circulate and condition mud. Drop dart and deploy logging tools. Log up from 3470 m.
- 27th December 2003** Continue logging from 3470 m to 2960 m. Pull out of hole to BHA and lay out. Lay out logging tools and down load radioactive sources. Remove wear bushing and jet BOP and well head. Carry out full scheduled BOP test. Install wear bushing and make up re-run bit. Run in with wiper trip BHA to 233 m. Run in hole.

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<b>28th December 2003</b>	Run in hole to bottom, precautionary wash last 2 stands. Circulate and condition mud. Pump sweep and add new mud. Circulate and condition new mud while pulling back from 3473.5 m to 3320 m. Pull out of hole to 621 m. Circulate and pump sweep. Pull out to 133 m and rack back BHA and lay out motor and bit. Pull wear bushing and jet BOP and well head. Change rams and pressure test to 1000 psi. Dress floor and rig up Weatherford to run casing. Make up shoe track.
<b>29th December 2003</b>	Run in hole with 7" production casing.
<b>30th December 2003</b>	Continue to run in hole with 7" production casing to 3466 m, attempt to push casing – no go. Attempt to circulate and work casing – no go. Increase pump rate and circulate and work casing – no go. Make up cement head and lines and circulate 250 bbls of treated mud. Howco test lines and cement 7" production casing. Displace and bump plug with 2000 psi. Wait on cement, rig down cement head, lift BOP and riser from 'A' section. Cameron set slips and seal assembly. Furmanite rough cut 7" production casing. Nipple up BOP to 'A' section and Cameron install 'B' section.
<b>31st December 2003</b>	Cameron continue to install 'B' section. Nipple up BOP and make up test assembly. Pressure test UPR, LPR and lay out test assembly. Remove test plug and install wear bushing. Make up casing scraper BHA to 36 m. Run in hole with 4" DP from 36 m to 2385 m, filling every 10 stands. Precautionary wash and ream last 2 stands and tag cement at 3440 m. Pump 45 bbl HiVis sweep; circulate hole clean with seawater and displace hole to inhibited seawater.
<b>1st January 2004</b>	Continue to circulate hole clean with seawater and displace hole to inhibited seawater. Lay out 4" DP from 3440 m to scraper assembly and lay out same. Howco pressure test casing. Pull wear bushing, jet BOP and well head. Rig up shooting nipple, FOBV and HLW and Howco pressure test same.
<b>2nd January 2004</b>	HOWCO pressure test shooting nipple, FOBV and HLW. Schlumberger arm guns, run in hole, perforate 3180.5 m to 3182.5 m and pull out of hole. Drink rate 1 bbl/hr. Arm guns, run in hole, perforate 3163 m to 3169 m and pull out of hole. Drink rate 2 bbl/hr. Schlumberger run in hole with 6" gauge ring to 3440 m and pull out of hole. Rig down Schlumberger, dress rig floor to run 3½" completion and run in hole with 3½" completion string to 884 m.
<b>3rd January 2004</b>	Run in hole with 3½" completion string from 884 m to 3207 m, Drink rate - static. Make up 4" DP pup joints and run in hole to 3213 m. Make up FOBV, Schlumberger HLW and HOWCO test same. Rig up Schlumberger sheaves and pull out of hole with 3½" tubing from 3213 m to 3209 m to EOT. Schlumberger run in hole with CCL and correlate packer setting depth EOT @ 3209. Work 3½" tubing and position @ 3208.5 m correlate OK and pull out of hole with wireline rig down Schlumberger.
<b>4th January 2004</b>	Rig down Schlumberger, change Bales and lay out pup joints to 3206 m. Space out to tubing hanger, Cameron re-connect control line and pressure test. Run in hole, land hanger and engage same, Cameron test hanger seals, rig up FOBV, rig up slick line lubricator, pressure test same and HES run in hole with N test tool and set same at 3207 m. HOWCO set packers, pull out of hole with N test tool and lay out lubricator. HOWCO test tubing, lock in same, test PA, release THRT and lay out same. Cameron run BPV, nipple down BOP and Riser, Cameron terminate control line and test upper void. Nipple up Xmas tree, Cameron test SRL seal, Xmas void and Shell test. Nipple up TOTCO BOP's, Riser and lubricator, HOWCO test same and HES run in hole with shifting tool to 3033 m and open sliding sleeve. Pull out of hole, round lubricator, Riser TOTCO BOP's, Install Xmas tree and reinstate Deck Grating, Hand over to production as of 2400 hrs 04/01/2004.

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## **Section 2**

### **Geological Summary**

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## FORMATION TOPS

DESCRIPTION	MD (m) RT	TVD (m) RT	TVD (m) SS
Lakes Entrance	2700	2030	-2000.55
Latrobe Group (TOL)	3142	2295.5	-2266.05
Coarse Clastics	3150	2300.0	-2270.55
M145 sand	3157.5	2303.8	-2274.35
M149 sand	3180	2315.4	-2285.95
M151 sand	3195.5	2323.8	-2294.35
M152 sand	3249.5	2350.5	-2321.05
M161 sand	3282	2366.2	-2336.75
M162 sand	3298	2374.2	-2344.75
M171A sand	3329	2389.6	-2360.15
M171B sand	3336.5	2393.2	-2363.75
Basal M172 sand	3365.5	2406.9	-2377.45
Basal M181 sand	3374.5	2411.2	-2381.75
Total Depth	3473.5	2456.67	-2427.22

## GEOLOGICAL SUMMARY

### GIPPSLAND LIMESTONE

549.5 m - 2700 m      **CALCILUTITE and CALCISILTITE with minor CLAYSTONE beds at depth**

**CALCILUTITE**      Pale olive grey to moderate olive grey, occasionally pale yellow brown, minor pale to light grey in parts, occasionally silty, microcrystalline in part grading to CALCISILTITE, minor to trace disseminated pyrite, trace fossil fragments and ooids, minor to trace lithics, soft to moderately hard, amorphous, sub-blocky to block in parts.

**CALCISILTITE**      Pale olive grey to moderate olive grey, occasionally pale yellowish grey, occasionally argillaceous grading to microcrystalline, grading to CALCILUTITE in parts, occasional minor off white crystalline LIMESTONE inclusions, minor to trace disseminated pyrite, trace fossil fragments and ooids, trace micro-micaceous in parts, soft to firm, predominantly firm to moderately hard with depth, amorphous to sub-blocky, sub-blocky to blocky in parts with depth.

**CLAYSTONE**      Light olive grey to olive grey, silty in part, moderate to very calcareous grading to CALCISILTITE in parts, common disseminated pyrite, common ooids, occasional fossils, soft to firm, sub-blocky to blocky, occasionally amorphous.

### LAKES ENTRANCE FORMATION

2700m - 3142 m      **Interbedded CALCILUTITE and CALCAREOUS CLAYSTONE**

**CALCISILTITE**      Light olive grey to olive grey, argillaceous in part grading to CALCAREOUS CLAYSTONE, common disseminated pyrite, common ooids, trace fossil fragments, slightly micro-micaceous, soft to firm, sub-blocky to blocky, occasionally amorphous.

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**CALCAREOUS  
CLAYSTONE**

Yellow grey to light olive grey, olive grey in part, rare medium grey to light bluish grey, rare disseminated glauconite, minor to com disseminated pyrite, slightly micro-micaceous in parts, common fossil fragments, trace ooids, trace lithics, trace carbonaceous specks, soft to firm, occasionally moderate hard to hard, sub-blocky to sub-fissile, locally blocky, minor fissile.

**LATROBE GROUP**

3142 m - 3150 m

**INTERBEDDED SANDSTONE AND SILTSTONE****SANDSTONE**

Off white to grey, fine to medium grained, moderately sorted, sub-angular, strong siliceous cement, trace dolomite cement, trace glauconite, common white argillaceous matrix, hard aggregates, tight visual porosity.

**FLUORESCENCE**

3140 m to 3150 m; 30% moderately bright even bluish white fluorescence, slow to moderately rapid instant cut, instant crush cut, thin ring residue.

**SILTSTONE**

Light olive grey to brownish grey, occasionally orange, argillaceous, grading to silty CLAYSTONE, trace micro-micaceous, firm, occasionally moderate hard, sub-blocky, occasionally sub-fissile.

**COARSE CLASTICS**

3150 m - 3205 m

**SANSTONE with minor interbedded SILTSTONE****SANDSTONE**

Clear to predominantly translucent, fine to predominantly medium grained, poorly sorted, sub-angular to sub-rounded, weak siliceous cement, trace white argillaceous matrix, trace pyrite nodules, predominantly loose grains, friable to occasionally moderately hard aggregates, poor to trace visual and inferred porosity.

**FLUORESCENCE**

3150 m to 3160 m; Trace to 20% moderately bright even bluish white fluorescence, slow streaming cut, moderately thick film residue.  
3160 m to 3165 m; Trace to 10% moderately bright even bluish white fluorescence, slow to moderately rapid instant cut, slow crush cut.  
3185 m to 3190 m; Trace to 5% moderately bright pin point bluish white fluorescence, slow instant cut, moderately rapid crush cut, patchy residue.  
3195 m to 3205 m; Trace to 5% moderately bright pin point bluish white fluorescence, slow instant cut, moderately rapid crush cut, patchy residue.

**SILTSTONE**

Brown black, greyish brown, occasionally medium grey, very carbonaceous, laminations in part, grading to silty COAL, common micro-micaceous, firm, occasionally moderately hard, sub-blocky.

3205 m - 3240 m

**SANDSTONE****SANDSTONE**

Clear to translucent, fine to coarse grained, predominantly coarse grained, moderately sorted, angular to sub-angular, predominantly sub-rounded, weak siliceous cement, trace pyrite cement, predominantly loose grains, fair inferred and visual porosity.

**FLUORESCENCE**

3205 m to 3220 m; Trace to 5% moderately bright pin point bluish white fluorescence, slow instant cut, moderately rapid crush cut, patchy residue.  
3225 m to 3230 m; 30% moderately bright green yellow fluorescence in kaolinitic matrix, slow streaming cut, moderately fast crush cut, thin film residue.  
3230 m to 3235 m; 30% moderately bright even bluish white fluorescence, slow instant cut, moderately fast crush cut, faint ring residue.  
3235 m to 3240 m; 30% moderately bright even bluish white fluorescence, moderately fast direct cut, slow crush cut, thick greenish yellow residue, thin film residue.

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3240 m - 3270 m

**SANDSTONE and interbedded SILTSTONE****SANDSTONE**

Clear to translucent, very fine to medium grained, occasionally coarse grained, predominantly fine grained, moderately sorted, angular to sub-rounded, trace pyrite cement, common light grey argillaceous matrix, trace nodular pyrite, poor to fair inferred and visual porosity.

**FLUORESCENCE**

3240 m to 3250 m; 30% moderately bright even bluish white fluorescence, moderately fast direct cut, slow crush cut, thick greenish yellow residue, thin film residue.  
3250 m to 3270 m; 20% to 30% moderately bright even bluish white fluorescence, slow bleeding cut, instant crush cut, thick ring residue.

**SILTSTONE**

Medium dark grey to brownish grey, argillaceous, slightly arenaceous, disseminated pyrite, rare carbonaceous specks, firm to moderately hard, sub-blocky to sub-fissile.

3270 m - 3329 m

**CLAYSTONE with interbedded SANDSTONE and minor SILTSTONE****SANDSTONE**

Clear to translucent, very fine to medium grained, predominantly fine grained, possibly bit crushed, moderately sorted, angular to sub-angular, trace pyrite cement, trace nodular pyrite, tight visual porosity

**FLUORESCENCE**

3285 m to 3295 m; Trace to 5% moderately bright pin point bluish white fluorescence, slow cut, rapid crush cut, thin film residue.  
3295 m to 3329 m; 35% to 5% moderately bright to bright even bluish white fluorescence, moderately rapid to bleeding cut, fast crush cut, thick to thin ring residue.

**CLAYSTONE**

Medium light grey to light olive grey, silty, grading to argillaceous SILTSTONE, trace calcareous, trace micro-micaceous, trace carbonaceous inclusions, sticky, soft, amorphous to sub-blocky.

**SILTSTONE**

Medium dark grey to brownish grey, argillaceous, slightly arenaceous, slightly micro-micaceous, disseminated pyrite, rare carbonaceous specks, firm to moderately hard, sub-blocky to sub-fissile.

3329 m - 3440 m

**SANDSTONE with minor interbedded SILTSTONE, CLAYSTONE and trace COAL****SANDSTONE**

Clear to translucent, occasionally opaque and light grey, fine to coarse grained, occasionally very coarse grained, dominantly fine to medium grained, poorly to moderately sorted, sub-angular to sub-rounded, rounded in part, angular bit produced fracture in part, trace pyrite cement, trace white argillaceous matrix in part, trace to occasionally minor nodular pyrite, dominantly loose grains, occasionally moderately hard aggregates, poor to fair porosity.

**FLUORESCENCE**

3329 m to 3365 m; 10% to 20% dull to moderately bright spotted bluish white fluorescence, slow bleeding cut, thin yellowish white film residue.  
3365 m to 3374 m; 5% to 10% dull to moderately bright spotted bluish white fluorescence, slow bleeding cut, fast crush cut, thin yellowish white film residue.  
3374 m to 3400 m Trace to 5% dull to moderately bright pin point bluish fluorescence, very slow diffuse cut, thin film residue.  
3400 m to 3440 m; Trace to 5% moderately bright pin point bluish white fluorescence, very slow cut, slow crush cut, thin ring residue.

**SILTSTONE**

(1) Dark yellowish orange, light to moderate brown, brown grey, black brown to dark brownish black, argillaceous, carbonaceous, grading to COAL in part, trace nodular pyrite in part, soft to firm, sub-blocky to sub-fissile.  
(2) Light grey to light olive grey, argillaceous, micro-micaceous in part, trace carbonaceous specks, minor to locally common disseminated pyrite, firm, sub-fissile to sub-blocky.

**CLAYSTONE**

Medium grey to light olive grey, grading to SILTSTONE, slightly calcareous, trace micro-micaceous, soft to moderately hard, amorphous to blocky.

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<b>COAL</b>	Brown black, dull to sub-vitreous, grading to CARBONACEOUS SILTSTONE, uneven to sub-fissile.
3440 m – 3473.5 m	<b>SANDSTONE</b>
<b>SANDSTONE</b>	Clear to translucent, fine to coarse grained, predominantly fine grained, poorly to moderately sorted, trace pyrite cement, trace nodular pyrite, generally loose, occasionally hard aggregates, poor porosity, no fluorescence.

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## GAS REPORT

Background gas was first observed from a depth of 690 mMDRT, where it was present in low concentrations of around 1 to 2 units. Present solely as methane (C1), it remained at low concentration until around 1000 mMDRT where a small increase of about 3 units was observed, but this was due to an increase of mud levels at the gas trap. Gas levels remained higher at about 3 to 5 units until 2530 mMDRT where background levels dropped off to between 0.05 and 0.5 units. This decrease was due to a combination of the fluctuation in the mud level at the gas trap and a build up of cuttings below the gas trap. Once the gas trap had been lowered the background gas levels increased to around 10 units.

Initially upon entering the Latrobe formation at 3142 mMDRT no increase in gas levels was observed until 3145 mMDRT where an increase to around 250 units was recorded, with the first sand lithology. This increase was accompanied by fluorescence, until 3165m, and an associated increase in heavier (ethane-C2 to pentane-C5) gases present. Upon penetration of the Coarse Clastics at 3150 mMDRT however there was an associated drop in the gas levels until drilling into the top of the M145 sand where levels resumed to around 250 to 300 units by 3166 mMDRT. From here the gas levels ranged from 100 to 400 units through the M149, M151 and the M152 sands. After the initial fluorescence at 3140 mMDRT to 3165 mMDRT the fluorescence was intermittent with further shows at 3185 mMDRT to 3190 mMDRT, 3195 mMDRT to 3220 mMDRT and a significant show from 3225 mMDRT to 3270 mMDRT within the M152 sand.

On drilling into the M161 sand there was an increase in gas levels from a background of 25 to 30 units to a peak of 889 units at 3301 mMDRT associated with the secondary target of the M162 sand. Gas levels dropped back from here to around 150 to 250 units peaking at 278 units at 3368.5 mMDRT and progressively dropping off to 28 units as the well approached total depth. Fluorescence was present right through this section from 3285 mMDRT to 3440 mMDRT.

Localised increases in background gas are attributed to both lithology variations and the penetration rate, which was dependant upon the drilling method (being either rotary or slide) carried out at the time. No CO<sub>2</sub> or H<sub>2</sub>S was detected while drilling Halibut A-6A.

### Gas Peaks through the Latrobe Group

Depth Metres	Total Gas units	C <sub>1</sub> %	C <sub>2</sub> %	C <sub>3</sub> %	iC <sub>4</sub> %	nC <sub>4</sub> %	iC <sub>5</sub> %	nC <sub>5</sub> %
3147.0	254.0	0.47	0.11	0.37	0.14	0.18	0.13	0.11
3161.0	214.9	0.81	0.14	0.36	0.10	0.14	0.08	0.08
3197.5	276.6	0.32	0.09	0.29	0.14	0.19	0.15	0.14
3218.0	269.3	0.40	0.09	0.30	0.13	0.18	0.13	0.12
3231.0	262.3	0.38	0.09	0.26	0.12	0.17	0.13	0.13
3237.0	391.0	0.50	0.16	0.41	0.23	0.34	0.20	0.18
3242.5	409.7	0.59	0.16	0.39	0.23	0.32	0.19	0.19
3251.0	383.7	0.50	0.15	0.35	0.20	0.29	0.17	0.17
3259.5	266.5	0.33	0.09	0.20	0.11	0.16	0.12	0.11
3291.0	813.1	0.90	0.22	0.46	0.30	0.44	0.29	0.29
3301.0	889.2	0.97	0.26	0.52	0.32	0.47	0.30	0.30
3335.0	214.4	0.29	0.06	0.13	0.09	0.12	0.10	0.10
3368.5	278.0	0.47	0.09	0.15	0.11	0.16	0.13	0.12
3387.5	225.5	0.30	0.06	0.13	0.09	0.13	0.11	0.10
3411.0	137.3	0.18	0.03	0.06	0.04	0.07	0.06	0.06
3420.5	111.1	0.36	0.05	0.05	0.03	0.05	0.04	0.04
3437.5	61.1	0.12	0.01	0.02	0.01	0.03	0.02	0.02
3461.0	38.8	0.08	0.00	0.01	0.01	0.01	0.01	0.01
3473.0	28.6	0.06	0.00	0.00	0.00	0.01	0.01	0.01

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