



WEST TUNA W-9

FINAL WELL REPORT

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SECTION 3 -- GEOSERVICES WELL LOGS

West Tuna W-9	MASTERLOG --	1:500 scale from 168 to 3012 metres 1:200 scale from 2650 to 3012 metres
West Tuna W-9	DRILLING LOG --	1:1000 scale from 168 to 3012 metres
West Tuna W-9	GAS RATIO LOG --	1:200 scale from 2650 to 3012 metres

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Section 1

General Well Summary

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WELL DATA

Operator : Esso Australia Ltd
Platform : West Tuna
Well name : West Tuna W-9
Country : Australia
Location : Gippsland Basin
Structure : Tuna M-1
Field : West Tuna
Permit : Vic/ L4

Location AMG co-ordinates 5 771 795.21 mN 621 486.71 mE

Location local co-ordinates Lat: 38° 11' 36.469" S Long: 148° 23' 14.399" E

Target Local co-ordinates 2186.734 mN 490.79 mW

Profile : Deviated
Reference depth : Rotary Table
RT to Seabed : 95.69 metres
RT above M.S.L. : 34.69 metres
Sea-water depth : 61.00 metres
Proposed total depth : 2985 metres
Actual total depth : 3012 metres
True vertical depth : 1446.38 metres
Spudded on : 5th September 2001
Total depth reached on : 15th September 2001

Drilling Contractor

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

Drilling Phases

<u>Diameter (inch)</u>	<u>From (m)</u>	<u>To (m)</u>	<u>Mud Type</u>
12¼"	168	842	Seawater / Gel
8½"	842	3012	KCl / glycol / PHPA

Cased Hole

<u>Casing Diameter (inch)</u>	<u>Casing Type</u>	<u>Shoe Depth (m)</u>
20"	Conductor Shoe	168 MDKB
9 ⁵ / ₈ "	Surface	836 MDKB
7"	Production	3003.6 MDKB

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MUD LOGGING

Logging Unit Number: 95

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

Sampling Interval

Sample Type	Number of sets	Quantity per set	Sampling interval	From (m)	To (m)
Washed and Dried	3	100 grams	10 metres	2600	2780
Washed and Dried	3	100 grams	5 metres	2780	3012

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

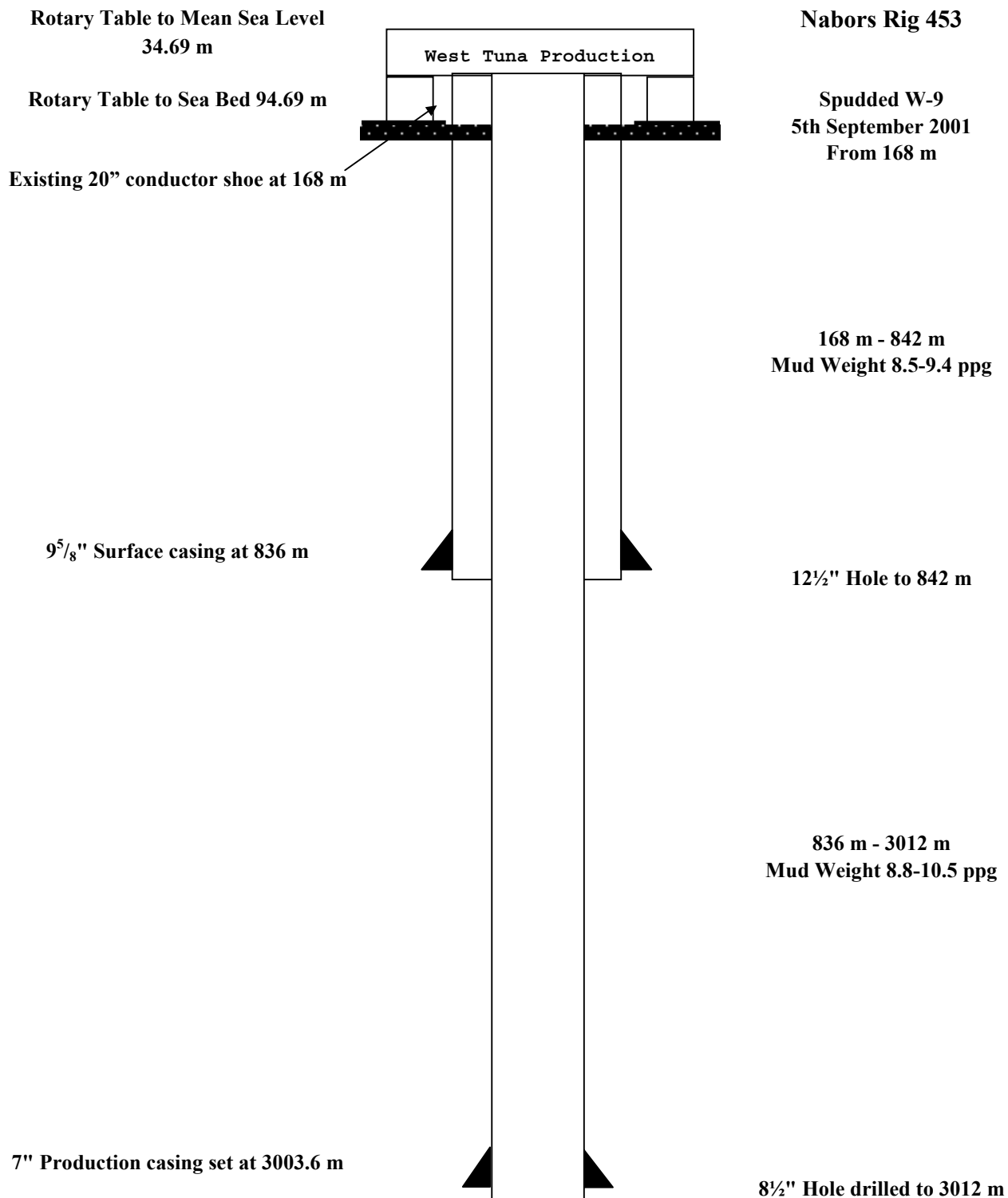
West Tuna W-9 is an infill well north of the West Tuna platform, with the primary objective of optimising well spacing and to enhance recovery efficiency of the M-1 oil reservoir. The well was drilled to a total depth of 3012 mMDRT (1446.39 m TVDRT) in 8½" hole and completed with a single oil completion string of 3½" tubing in 7" production casing.

West Tuna W-9 was spudded at 03:00 hours on 5th September 2001 after drilling out of the 20" conductor shoe.

After skidding the rig across from West Tuna W-16, a 12¼" steerable assembly, with a Geodiamond M91PV bit was made up and used to drill this hole section with a Gel/Seawater mud system. A mud weight of 9.4 ppg was maintained by dilution with water and prehydrated Gel. The final depth for this section was 842 m. The 9⅝" casing was run and cemented at 836 m. An 8½" LWD/MWD steerable assembly with a Geodiamond S75HPX bit was made up and run. The shoe track and 3 m of new formation to 847 m was drilled and the well displaced to a 8.8 ppg KCl/PHPA/Polymer mud prior to the required P.I.T. being performed (12.5 ppg EMW at 460 psi). The well was then drilled to 2688 m where a wiper trip was conducted as per program. However due to tight hole the mud weight was increased to 10.4 ppg and the pipe worked through tight sections at 1420 m, 1304 m and 1150 m prior to resuming drilling. At 2977 m high torque was encountered and the string was unable to be rotated and Finagreen was added with a 4 stand wiper trip. Once torque had been successfully reduced drilling was resumed and the hole was drilled to a Total Depth at 3012 m. Baracarb-25 and Baracarb-100 were added to the mud system prior to entering the Latrobe Formation to bridge the pore throats and reduce the likelihood of differential sticking and seepage losses.

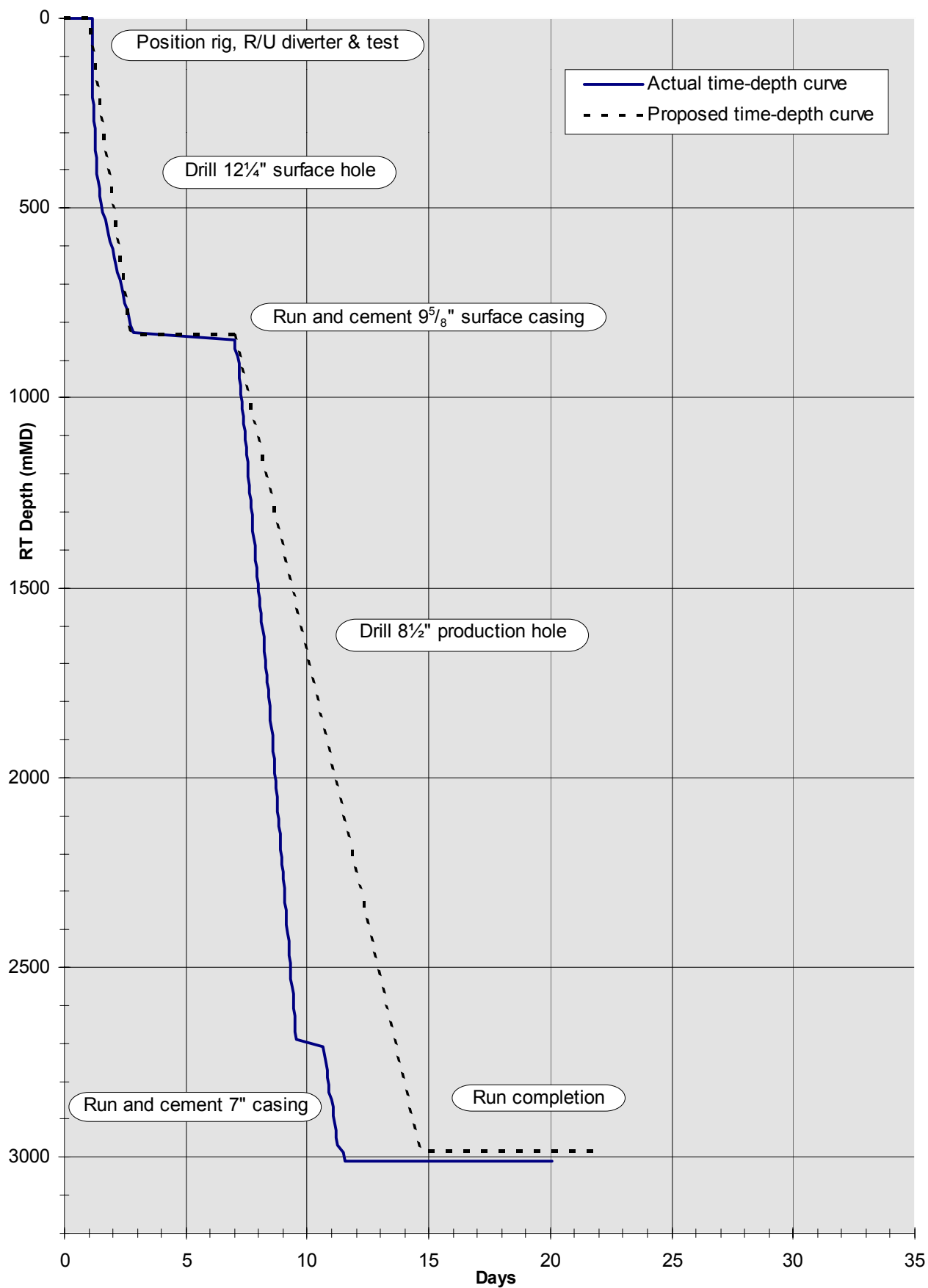
West Tuna W-9 reached a Total Depth of 3012 m (1446.39 mTVD) at 12:30 hours on 15th September 2001. The final survey at a depth of 2992.32 m had an inclination of 72.70° and an azimuth of 349.1°. 7" liner was set at a depth of 3003.6 m. West Tuna W-9 was completed as a single oil string with 3½" completion tubing run to 2884.38 m. West Tuna W-9 was handed over to Production on 24-09-2001 at 0100 hours.

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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
1RR	12¼"	Geodiamond M91PV	7 x 16	168	842	29.65	1-1-WT-A-X-IN-NO-TC
2RR	8½"	Smith S75HPX	7 x 14	842	3012	46.77	6-7-A-WT-X-IN-CT-TD

CASING DATA

Type	Size (Inches)	Weight (lb/ft)	Grade	Thread	Depth (mMDRT)
Surface	9 ⁵ / ₈ "	47	L-80	LT&C/VAM ACE	836
Production	7"	26	L-80	LT&C	3003.6

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)
9 ⁵ / ₈ "	ABC Class G	720	14.6 gal/10bbl Econolite	215	283.5	12.5	Surf-846	2000/ 15 min
		300		37	68.8	15.9		
7"	ABC Class G	849	32 gal/10bbl Halad 413	105	175.4	15.8	2259-3012	2000/ 15 min
			1 gal/10bbl SCR-100					

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WELL DIRECTIONAL PROFILE
(from Geoservices Software)

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WELL DIARY

4th September 2001	Skid to W-9 and reinstate rig. Rig and nipple up riser, diverter, overboard line, bell nipple, flowline and trip tank line.
5th September 2001	Make up 12¼" bit and BHA. Shallow test MWD tools and run in hole, tag cement at 168 m. Displace hole to mud and drill, steer and survey hole from 168 m to 619 m.
6th September 2001	Drill, slide and survey hole from 619 m to 842 m. Circulate bottoms up at 842 m and pull out of hole to shoe; conduct rig service.
7th September 2001	Rotate and work string while circulating hole clean. Continue to run in hole. Wash and ream last two stands. Circulate bottoms up, slug pipe and pull out of hole. Rack back HWDP, lay out jar and flush BHA. Rig up to run 9 ⁵ / ₈ " casing. Run in hole with 9 ⁵ / ₈ " casing. Rig up cement lines and cement head. Break circulation and pump 1½ times casing volume. Cement 9 ⁵ / ₈ " casing as per program. Wait on cement.
8th September 2001	Rig down cement head and lines and monitor well while waiting on cement. Rig service. Change out pump liners and dress and cut 20" conductor and 9 ⁵ / ₈ " casing. Rig down and lay out Bell nipple, diverter and riser.
9th September 2001	Nipple up BOP, Riser and Bell nipple, complete changing out pump liners. Pick up BHA to pipe deck. Pressure test BOP's, leak, troubleshoot BOP leak.
10th September 2001	Complete pressure testing - OK Pick up and make up 8½" BHA and run in hole with same. Run in hole and shallow test MWD, load radio active source and run in hole on HWDP to 248 m. Pick up singles of 5" drillpipe and run in hole 248 m to top of cement at 804 m. Rig up HOWCO and pressure test casing 200/2000 psi, drill cement and shoe track from 804 m to 847 m and displace hole to 8.8 ppg mud. HOWCO conduct P.I.T. test (460 psi, 12.5 ppg EMW)
11th September 2001	Drill, steer and survey 8½" hole from 847 m to 1504 m.
12th September 2001	Drill, steer and Survey 8½" hole from 1504 m to 2254 m.
13th September 2001	Drill, steer and survey 8½" hole from 2254 m to 2688 m. Work and rotate string racking back 1 stand every ½ hour whilst circulating hole clean, flow check - well static. Pump slug and pull out of hole to 2031 m where hole pulled tight (20 klbs overpull). Run in hole from 2031 m to 2100 m, work and rotate string whilst circulating hole clean. Pull out of hole from 2100 m to 1720 m working pipe through tight spots from 1950 m to 1726 m, run in hole to bottom. Work and rotate string racking back 1 stand every ½ hour whilst increasing mud weight to 10.4 ppg and circulating hole clean.
14th September 2001	Continue to increase mud weight to 10.4 ppg and circulating hole clean. Flow check - well static. Pull out of hole wet from 2631 m to 2486 m, flow check - well static, pump slug and continue to pull out of hole to 836 m working pipe through tight spots at 1420 m, 1304 m and 1150 m. Run in hole from 836 m to 2688 m washing and reaming the last 2 stands. Drill, steer and survey 8½" hole from 2688 m to 2838 m. Pressure loss while pumping of 600 psi, trouble shoot and repair suction valve.
15th September 2001	Drill, steer and survey 8½" hole from 2838 m to 2977 m. Unable to rotate string after connection, rack back 1 stand whilst working string free and conditioning mud with Finagreen "EBL" from 2977 m to 2777 m. Run in hole from 2777 m to 2977 m and drill, steer and survey 8½" hole from 2977 m to TD at 3012 m. Rotate and work string while circulating 1.5 times Latrobe open hole volume, back ream out of hole from 3012 m to 2718 m. Rotate and work string racking back 1 stand every ½ hour whilst circulating hole clean. Flow check - well static, pump slug and pull out of hole from 2689 m to 800 m and circulate hole clean. Run in hole from 800 m.

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16th September 2001	Continue to run in hole to TD at 3012 m. Circulate Latrobe clean and backream to 50 m above top of Latrobe. Circulate 1.5 times bottoms up until hole clean Flow check well - well static, pull out of hole from 2718 m to 809 m and circulate hole clean, continue to pull out of hole from 809 m to 248 m. Rack back HWDP, down load radioactive source and lay out drilling assembly. Run in hole with 5" drillpipe to 599 m and pull out of hole laying out drillpipe to 398 m. Wait on weather - strong winds, winds abate resume laying out drillpipe. Retrieve wearbushing, jet BOP's and Wellhead, change out BOP rams to 7" and run in hole with test plug assembly. Pressure test BOP's.
17th September 2001	Continue to pressure test BOP's 300/3000 psi - OK and rig up Weatherford to run 7" casing. Run 7" production casing as per program filling casing every 5 joints.
18th September 2001	Continue to run 7" production casing as per program to 3004 m filling casing every 5 joints. Make up circulating head and lines, break circulation and rig down Weatherford. Install cementing head and lines and circulate hole clean. HOWCO mix and pump cement as per ESSO program. Unable to bump plug. Rig down cement lines and monitor well, rig up HOWCO and pressure test casing 2000 psi / 15 minutes OK, rig down cement lines. Nipple down and lift Riser from A section, Cameron set slips and seal assembly, Furmanite prepare and rough cut casing. Lay out landing joint, Furmanite make final cut, Cameron orientate and install B section, pressure test same, Nipple up riser, BOP's bell nipple and flow line.
19th September 2001	Continue to nipple up BOP, riser, flowline and bell nipple. Change out TDU handling gear from 4½" to 3½". Slip and cut drill line. Pressure test upper and lower rams. Make up wear bushing tool and run wear bushing. Break down running tool and clear rig floor. Rig to pick up and make up 7" casing scraper assembly on 3½" drillpipe and run in hole to 2222 m, rabbiting every joint.
20th September 2001	Continue to run in hole with scraper and tag cement at 2966 m. Drill out cement from 2966 m to 2978 m. Circulate hole clean with seawater, pump 30 bbl mud sweep and continue circulating until clean. Displace hole to 9.1 ppg inhibited brine. Pressure test casing to 2000 psi OK. Pull out of hole. Lay out scraper and BHA. Make up TCP guns and 7" BWD packer and run in hole on 3½" drillpipe.
21st September 2001	Continue run in hole to approximately 9 m past the packer. Rig up Schlumberger. Position guns and final correlation to confirm perforating depth. Depth set at 2856 m. Halliburton drop ball. Make up test assembly surface lines and test same. Rig down Schlumberger whilst allowing ball to drop. Set BWD packer as per Halliburton instructions. Rack back 2 stands and shear ball seat at 3900 psi. Pull out of hole with 3½" drillpipe.
22nd September 2001	Continue to pull out of hole with 3½" drillpipe and lay out sideways. Break down and lay out BWD packer running tool. Rig up and run 3½" completion tubing.
23rd September 2001	Continue run 3½" completion tubing to 2428 m. Pick up and make up TRSV, control line and pressure test to 4000 psi. Run in hole with tubing to 2850 m and sting into packer. Pick up and make up hanger and land and set. Pressure test hanger and lines. Pull hanger setting tool and install BPV. Nipple down BOP and pull riser. Terminate control lines and install Xmas tree, wing v/v and crown cap. Pressure test seals, check v/v and tree. Rig up and remove BPV and make up pump down flange to tree. Pressure test lines, tubing and production annulus. Rig down surface lines and close TRSV.
24th September 2001	Reinstate deck plates. Hand over W-9 to Production at 01:00 hours.

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Section 2 Geological Summary

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FORMATION TOPS

DESCRIPTION	MD (m) - RT	TVD (m) - RT
Top of Lakes Entrance	2031	1117.5
Top of Latrobe Group	2777	1369
Top of Coarse Clastics	2802.5	1378
TOTAL DEPTH	3012	1446.38

GEOLOGICAL SUMMARY**LAKES ENTRANCE FORMATION**2031 m - 2777 m **CLAYSTONE**

CLAYSTONE: Light grey to light olive grey, occasional medium grey in part, calcareous, locally grading to traces of siltstone, trace disseminated and nodular pyrite, trace to locally common ooids and microfossil fragments, trace carbonaceous specks, traces of crystalline calcite fragments, dominantly soft to firm, sub-blocky to blocky.

LATROBE FORMATION2777 m - 2802.5 m **Interbedded CLAYSTONE and SILTSTONE**

CLAYSTONE: Dark yellow orange, off white, light grey to medium grey, light mottled greenish grey, arenaceous in part, nodular glauconite in part, occasional medium quartz grains, very soft, sub-blocky to amorphous in part.

SILTSTONE Dark yellow orange, light to medium brown, greenish brown in part, argillaceous and arenaceous grading to very fine sandstone, occasional nodular glauconite, trace carbonaceous material, soft to firm, blocky.

COARSE CLASTICS2802.5 m - 3012 m **SANDSTONE with minor SILTSTONE**

SANDSTONE: Clear to translucent, opaque and milky in part, coarse to predominantly very coarse, grading with depth to medium to coarse, generally poorly sorted, sub-angular to angular, fractured quartz grains in part, trace to locally minor pyritic cement, siliceous cement, traces of nodular pyrite, generally loose and clean, fair to good inferred porosity.

SILTSTONE Light greyish brown, brownish grey, occasionally light greyish green, argillaceous, trace arenaceous in parts, firm to moderately hard, sub-fissile to sub-blocky.

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GAS REPORT

No gas was recorded while drilling out from the conductor at 168 m. Gas was first recorded at 405 m and consisted of C₁ (Methane). The composition of the gas remained unchanged throughout the 12¼" hole section and in the 8½" hole section until 1310 m, where traces of C₂ (Ethane) were detected. In this section of the hole total hydrocarbon gases detected began at 3 to 5 units and by 1100 m were between 30 and 40 units. C₁ being the only component of the gas in this section varied accordingly.

Prior to entering the Lakes Entrance formation the only gases detected were C₁ and C₂ with C₂ increasing gradually with depth from trace amounts at 1310 m to constitute 3% of the detected gas at 2031 m. Very small amounts of connection gas appeared towards the base of this section and ranged from 2 to 5 units.

On entering the Lakes Entrance formation the composition of the gas remained unchanged. Detected total gas stayed between 30 and 40 units. With depth this changed as the composition of the gas began to include higher concentrations of C₂ and trace amounts of C₃ at 2230 m gradually increasing to 1% C₃ at 2390 m. Total detected gases increased to range from 40 to 60 units shortly before entering the Latrobe formation, although due to a wiper trip and slower penetration rate, immediately before entering the Latrobe gas levels were ranging from 25 to 45 units.

On penetrating the Latrobe formation at 2777 m an immediate increase in gas levels was observed. The composition of the gas also changed dramatically with an increase in the heavier gases indicating the first hydrocarbon bearing lithology. The mud weight in this section was increased to 10.4 ppg prior to entering the Latrobe. Gas levels throughout the Latrobe were consistently over 500 units with sustained peaks over several metres having levels over 1000 units. The lowest levels of gas throughout the Latrobe were 200-300 units with an estimated background gas level of between 500 and 700 units. After 2940 m gas levels steadily dropped to 50 units at TD.

Localised increases in background gas are attributable to the penetration rate which was dependant upon the drilling method, being either rotary or slide, carried out at the time. Changes in gas levels were also noticed after short wiper trips. No CO₂ or H₂S was detected while drilling West Tuna W-9.

Gas peaks through the Latrobe Group

Depth metres	Total Gas units	C ₁ %	C ₂ %	C ₃ %	iC ₄ %	nC ₄ %	iC ₅ %	nC ₅ %
2777	31	0.47	0.03	0.02	0	0.01	0	0
2785	1278	14.81	1.14	0.53	0.10	0.16	0.07	0.06
2790	780	10.10	0.63	0.31	0.07	0.11	0.06	0.06
2809.5	829	9.93	0.66	0.32	0.07	0.11	0.06	0.05
2862.5	1305	16.04	1.12	0.56	0.10	0.16	0.08	0.07
2878	1220	15.99	1.13	0.49	0.09	0.15	0.07	0.07
2886	1075	13.27	1.04	0.56	0.11	0.19	0.10	0.09
2906	1166	8.65	1.23	0.93	0.21	0.41	0.23	0.20
2913	1374	10.13	1.57	1.26	0.29	0.45	0.30	0.28
2953	362	1.07	0.25	0.26	0.09	0.17	0.08	0.07

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