



WEST TUNA W-15

FINAL WELL REPORT

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SECTION 3 -- GEOSERVICES WELL LOGS

West Tuna W-15	MASTERLOG --	1:500 scale from 169 to 3030 metres 1:200 scale from 2640 to 3030 metres
West Tuna W-15	DRILLING LOG --	1:1000 scale from 169 to 3030 metres
West Tuna W-15	GAS RATIO LOG --	1:200 scale from 2800 to 3030 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-15
Country : Australia
Location : Gippsland Basin
Structure : Tuna M-1
Field : West Tuna
Permit : Vic/ L4

Location AMG co-ordinates 5 771 792.31 mN 621 486.77 mE

Location local co-ordinates Lat :38° 11' 36.563" S Long :148° 23' 14.403" E

Target Local co-ordinates 88.77 mS 2275.82 mE

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 : 3045 metres
Actual total depth : 3030 metres
True vertical depth : 1457.69 metres
Spudded on : 11th August 2001
Total depth reached on : 22nd August 2001

Drilling Contractor

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

Drilling Phases

Diameter (inch)	From (m)	To (m)	Mud Type
12¼"	168	835	Seawater / Gel
8½"	835	3030	KCl / glycol / PHPA

Cased Hole

Casing Diameter (inch)	Casing Type	Shoe Depth (m)
20"	Conductor Shoe	168 MDKB
9 ⁵ / ₈ "	Surface	831 MDKB
7"	Production	3027 MDKB

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MUD LOGGING

Logging Unit Number: 95

Engineers: M. Smith, M. Boyd, G. Dóczy.

Sampling Interval

Sample Type	Number of sets	Quantity per set	Sampling interval	From (m)	To (m)
Washed and Dried	3	100 grams	10 metres	2640	2810
Washed and Dried	3	100 grams	5 metres	2810	3030

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-15 is an infill well east 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 to be drilled to a total depth of 3030 m MDRT (1457.69 m TVDRT) in 8½" hole and completed with a single oil completion string of 3½" tubing in 7" production casing.

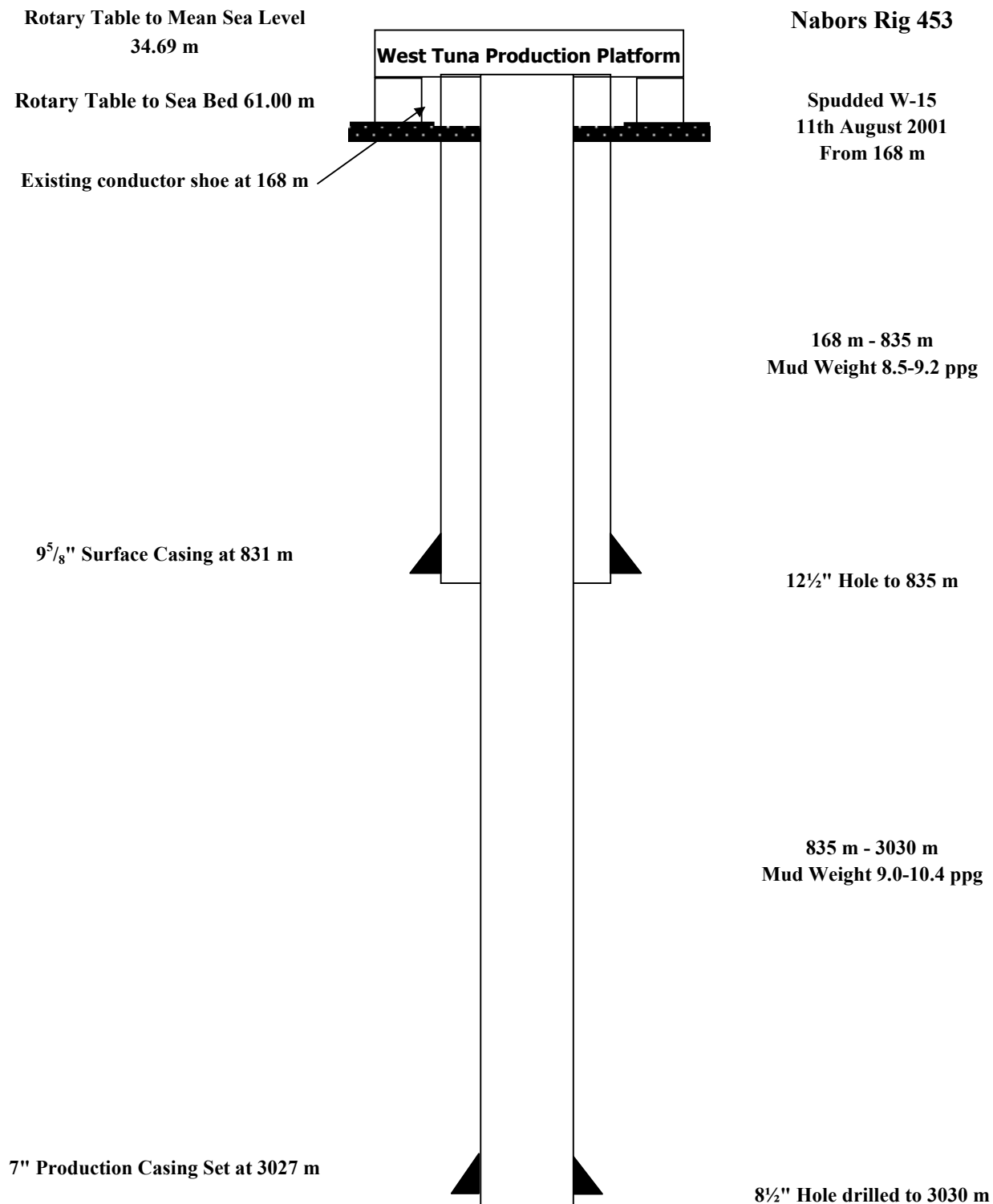
West Tuna W-15 was spudded at 17:00 hours on 11th August 2001 after drilling out of the 20" conductor shoe.

After skidding the rig across from West Tuna W-4a-Redrill, a 12¼" steerable assembly, with a Reed-Hycalog DS 195 PDC bit was made up and used to drill this hole section with a Gel/Water mud system. A mud weight of 9.2 ppg was maintained by dilution with water and prehydrated Gel. The final depth for this section was 835 m. The 9⁵/₈" casing was run and cemented at 831m. An 8½" LWD/MWD steerable assembly with a Geodiamond S75BHPX bit was made up and run. The shoe track and 3 m of new formation were drilled and the well displaced to a 9.0 ppg KCl/PHPA/Polymer mud before a P.I.T. was performed (12.6 ppg EMW at 434 psi with 9.0 ppg) to ESSO requirements. The well was rotary and slide drilled ahead from 838 m to 1162 m where a multishot gyro survey was run. The well was rotary and slide drilled ahead from 1162 m to Total Depth at 3030 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-15 reached a total depth of 3030 m (1457.69 mTVD) at 15:30 hours on 22nd August 2001. The final survey at a depth of 3010.71 m had an inclination of 68.63° and an azimuth of 91.3°. 7" liner was run to a depth of 3027 m. West Tuna W-15 was completed as a single oil string with 3½" completion tubing run to 2848 m. West Tuna W-15 was handed over to Production on 31-08-2001 at 13:30 hours.

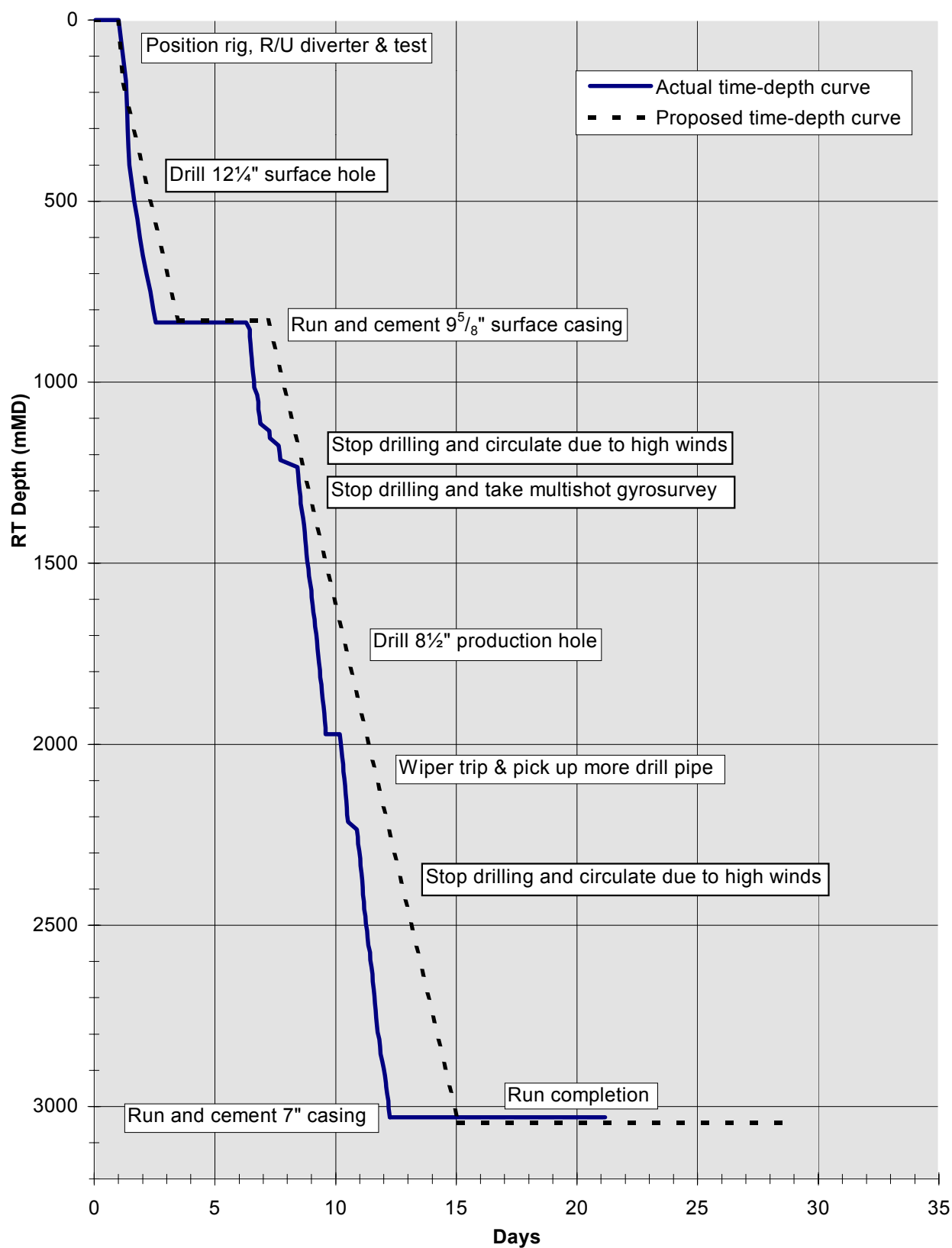
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WELL PROFILE



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WEST TUNA W-15 TIME-DEPTH CURVE (measured depth)



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BIT SUMMARY

BIT	Size (")	Type	Jets	In (m)	Out (m)	Hours	Condition
1RR	12¼"	Reed-Hycalog	5 x 16	168	835	19.25	1-1-WT-G-X-I-CT-TC
2	8½"	Geodiamond S75BHPX	7 x 14	835	3030	53.5	5-4-WT/CT-A/S/T-X-I-PN-TD

CASING DATA

Type	Size (Inches)	Weight (lb/ft)	Grade	Thread	Depth (mMDRT)
Surface	9 ⁵ / ₈ "	47	L-80	LT&C	831
Production	7"	26	L-80	LT&C	3027

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	719	0.25 gal/10bbl NF-5	223 s/w	283	12.5	Surf-632.5	2000
		300	14.6 gal/10bbl Econolite	37 s/w	62	15.9	632.5-831	
7"	ABC Class G	860	Halad-413L, SCR- 100L,NF-5	105	178	15.8	2283-3027	2000

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WELL DIRECTIONAL PROFILE
(from Geoservices Software)

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WELL DIARY

10th August 2001	Skid rig to W15 and nipple up service lines and mud lines to pump room.
11th August 2001	Continue rigging up over W15. Reinstate rig service lines, mix up drilling mud. Rig up to handle BHA. Pick up and service MWD tool, lay out. Function test and circulate through diverter, flow lines and trip tank. Pick up MWD and directional BHA tools. Run in hole to 60m and shallow test MWD tools. Run in hole with Heavyweight drill pipe, pick up drilling jar, wash and ream from 130 m to 168 m. Displace hole to mud. Spud WTN-W15 at 17:00 hours, drill steer and survey 12¼" hole.
12th August 2001	Drill, steer and survey 12¼" hole from 466 m to 835 m.
13th August 2001	Continue to circulate hole clean, pump slug and pull out of hole from 835 m. Perform rig service at shoe, continue to pull out of hole, lay out 8" drill collar and rack back MWD tools. Rig up to run 9 ⁵ / ₈ " surface casing. Run casing, rig up Halliburton and pressure test lines. Circulate bottoms up and rig up to pump cement. Pump and displace cement, wait on cement.
14th August 2001	Continue to wait on cement, rig down cement head and change out elevators. Rig up to lift Bell nipple. Furmanite to prepare to rough cut casing above diverter. Rough cut casing then rough cut conductor. Final cut and dress 9 ⁵ / ₈ " casing. Perform scheduled rig maintenance. Install 6" liner on mud pumps. Clean pits and mix mud, continue with maintenance, pressure test manifold and lines.
15th August 2001	Continue with work on A section, heat treat and cool casing. X-ray welds on braden head and check results. Nipple up Riser, BOP's, function test kookey unit and pick up and make up BOP test assembly. Shell test riser. make up wear bushing and run. Service rig and inspect TDS torque beam. Make up 8½" stabiliser and drift well head. Begin to pick up and make up 5" drill pipe.
16th August 2001	Continue to pick up and make up 5" drill pipe. Run in hole and tag cement at 796 m, break circulation and pull out of hole. Pick up BHA. Run in hole, drill cement and 3 m new hole. Displace hole to mud and condition mud. Perform PIT Drill ahead 8½" hole from 838 m to 989 m.
17th August 2001	Drill ahead 8½" hole from 989 m to 1018 m. Stop drilling for multishot survey but too windy to rig up. Drill ahead from 1018 m to 1133 m. Circulate hole clean and wait on weather, high winds 55 knots+. Drill new hole from 1133 m to 1162 m. Circulate hole prior to Gyro survey. Lay out single and run multishot gyro survey.
18th August 2001	Complete multishot gyro survey. Drill 8½" hole from 1162 m to 1220 m. Stop drilling and circulate due to high winds. Pull 3 singles to avoid washing one section of hole and continue to circulate while waiting on weather. Run in hole 3 singles and drill new hole from 1220 m to 1352 m.
19th August 2001	Drill 8½" hole from 1352 m to 1972 m. Circulate prior to wiper trip.
20th August 2001	Slip and cut drill line. Pick up drillpipe required to reach TD while run in hole. Continue to run in hole with stands and drill 8½" hole from 1972 m to 2224 m. Stop drilling and circulate while wait on high winds to abate.
21st August 2001	Wait on weather. Drill 8½" hole from 2224 m to 2688 m.
22nd August 2001	Drill 8½" hole from 2688 m to 3030 m. Circulate hole clean and pull 3 stands above top of Latrobe and circulate clean at maximum pump rate. Flow check and pull out of hole.
23rd August 2001	Pull out of hole to shoe. Wiper trip back to bottom and circulate hole clean. Pull out of hole to 50m above Latrobe and circulate clean. Slug pipe, pull out of hole and lay out excess 5" tubulars.
24th August 2001	Continue to pull out of hole and lay out excess 5" tubulars and MWD tools. Pull wear bushing and change out rams, pressure test. Rig up casing gear and run 7" casing as per running list.

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25th August 2001	Continue to run 7" casing and land as per programme. Circulate casing and cement as per programme. Wait on cement to set. Nipple down BOP's.
26th August 2001	Continue to nipple down BOP's. Install 7" casing slips. Rough cut 7" casing and dress same. Nipple up BOP's and pressure test.
27th August 2001	Continue to pressure test BOP's. Run wear bushing. Make up 7" casing scraper and run in hole to 2870 m. Break circulation and wash down from 2870 m to top of cement at 2994 m. Drill out cement to 3000 m. Displace hole to seawater and circulate clean. Displace to brine. Pressure test casing.
28th August 2001	Pull out of hole with casing scraper. Lay out 3½" drillpipe from 195 m. Lay out casing scraper. Rig up Schlumberger. Run in hole with guns and packer on drillpipe. Run in hole with Schlumberger to correlate for gun positioning.
29th August 2001	Correlate TCP gun depth with Schlumberger. Pull out of hole and rig down Schlumberger. Make up side entry sub and Halliburton drop ball. Rig up Halliburton and pressure test lines. Halliburton set BWD packer. Halliburton pressure up and set packer; ball shears. Pick up and layout pump in sub. Pull out of hole sideways from 2838 m to 2282 m. Rack 22 stands in derrick, then continue to pull out of hole sideways. Lay out setting tool, pull wear busing and jet BOP's and wellhead. Rig up and run 3½" completion tubing.
30th August 2001	Continue to run 3½" completion tubing to 2419 m. Pick up and make up TRSSSV and pressure test to 4000 psi. Run in hole with TRSSSV and lines to 2848 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.
31st August 2001	Nipple down BOP and pull riser. Terminate control lines and install THAF and Xmas tree. 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. Reinstate deck plates. Hand over W-15 to Production at 13:30 hrs.

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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	2134	1145
Top of Latrobe Group	2824.5	1383.5
Top of Coarse Clastics	2849	1392
TOTAL DEPTH	3030	1457.69

GEOLOGICAL SUMMARY**LAKES ENTRANCE FORMATION**2134 m - 2824.5 m **CLAYSTONE**

CLAYSTONE: Light grey to grey green, light medium grey to medium dark grey, moderately calcareous, slightly silty in part, locally slightly micromicaceous, trace fossil fragments, locally trace carbonaceous specks and flecks, trace disseminated pyrite, locally trace glauconite, very soft to firm, occasional moderately hard, amorphous to blocky, sub-blocky in part.

LA TROBE FORMATION2824.5 m - 2849 m **Interbedded CLAYSTONE and SILTSTONE**

CLAYSTONE: Dark yellow orange, medium yellow brown in part, moderately calcareous, common limonitic staining, trace glauconite, soft, amorphous.

SILTSTONE Grey brown, medium brown, argillaceous, minor very fine arenaceous, firm, occasional moderately hard, blocky.

COARSE CLASTICS2849 m - 3030 m **SANDSTONE with minor SILTSTONE and CLAYSTONE**

SANDSTONE: Clear, translucent, milky, medium to coarse, occasional very fine and very coarse, poorly sorted, sub-angular to sub-rounded, occasional white to light grey argillaceous matrix, trace pyrite cement, common pyrite nodules, trace glauconite, loose and clean, good inferred porosity, no fluorescence.

SILTSTONE Grey brown, medium brown, argillaceous, minor very fine arenaceous, firm, occasional moderately hard, blocky.

CLAYSTONE: Light brown grey to medium grey, rare light grey, weakly calcareous, carbonaceous specks, very soft, amorphous.

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GAS REPORT

No gas was recorded while drilling out from the conductor at 168 m. Gas was first recorded at 413 m. This Gas, consisting of C₁ (Methane), continued through to 732 m where traces of C₂ (Ethane) were detected. Trace amounts (0.01 to 0.02%) of C₂ persisted through to 835 m which was the bottom of the 12¼" hole section. Due to less volume of rock being drilled in the 8½" hole section, C₁ only was seen ranging between 0.1% and 0.3% until the Claystone of the Lakes Entrance formation. Connection gas was detected from 1700 m to 2550 m and ranged from 8 units to 25 units above background gas with an average connection gas approximately 20 units above the background gas. There were no significant gas peaks throughout this section with the trend of the gas curve matching the ROP. The gas level in this section ranged from 5 to 88 units with the average being around 35 units.

In the Claystone of the Lakes Entrance formation the trend of the gas curve was to increase gradually from an average of around 35 units at 2500 mMDRT to between 50 and 70 units near 2824 mMDRT. The gas consisted predominantly of C₁ with C₂ and C₃ gradually increasing. C₂ from trace amounts to 0.07%; and for C₃, from trace amounts to 0.03% prior to entering the Latrobe at 2824.5 mMDRT. On penetrating the Latrobe Formation at 2824.5 mMDRT, there was a marked increase in the gas levels, not only in magnitude, but also in composition, indicating the first hydrocarbon bearing lithology. Drilling with a mud weight of 10.2 ppg, the background gas ranged from 50 to 100 units, consisting of gas components from C₁ to C₅. Background gas levels remained elevated drilling through the Coarse Clastics with an average of 200 units, consisting of gas components from C₁ to C₅.

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. No CO₂ or H₂S was detected while drilling West Tuna W-15.

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 %
2849	2098	34.84	2.13	1.04	0.18	0.31	0.11	0.11

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