



WEST TUNA W-22

FINAL WELL REPORT

Prepared by

Geoservices Overseas S.A.

Engineers: M. Smith, M. Boyd, G. Doczy, P. Misquitta

Esso Australia Ltd.
12 Riverside Quay,
South Bank, Melbourne
Victoria 3006
Australia
Tel: (03) 9270-3625
Fax: (03) 9270-3593

Geoservices Overseas SA
Unit 8, 14-22 Farrall Road,
Midvale, Perth
Western Australia 6056
Australia
Tel : (08) 9250-2010
Fax : (08) 9250-2715

CONTENTS

SECTION 1 -- GENERAL WELL SUMMARY

WELL DATA	4
MUDLOGGING	5
WELL SUMMARY	6
WELL PROFILE	7
DAY VS DEPTH PLOT	8
BIT SUMMARY	9
CASING & CEMENTING DETAILS	9
WELL DIRECTIONAL PROFILE	10
WELL DIARY	11

SECTION 2 -- GEOLOGICAL SUMMARY

FORMATION TOPS	15
GEOLOGICAL SUMMARY	15
GAS REPORT	17

SECTION 3 -- GEOSERVICES WELL LOGS

West Tuna W-22 MASTERLOG --	1:500 scale from 150 to 2552 metres 1:200 scale from 2310 to 2552 metres
West Tuna W-22 DRILLING LOG --	1:1000 scale from 150 to 2552 metres
West Tuna W-22 GAS RATIO LOG --	1:200 scale from 2310 to 2552 metres

Revision	Date	Issued by	Approved by	Remarks
1	25-06-2001	Geoservices Unit 95	Base Mudlogging Coordinator	

Section 1
General Well Summary

Revision	Date	Issued by	Approved by	Remarks
1	25-06-2001	Geoservices Unit 95	Base Mudlogging Coordinator	

WELL DATA

Operator : Esso Australia Ltd
Platform : West Tuna
Well name : West Tuna W-22
Country : Australia
Location : Gippsland Basin
Structure : Tuna M-1
Field : West Tuna
Permit : Vic/ L4

Location AMG co-ordinates 5 771 790.74 m N 621489.54 m E
Location local co-ordinates Lat : 35° 11' 36.613" S Long : 148° 23' 14.518" E
Target Local co-ordinates 378.33 m N 1729.06 m W

Profile : Deviated
Reference depth : Rotary Table
RT to Seabed : 95.69 metres
RT above M.S.L. : 34.69 metres
Sea-water depth : 61.0 metres
Proposed total depth : 2486.0 metres
Actual total depth : 2552.0 metres
True vertical depth : 1451.0 metres
Spudded on : 5th June 2001
Total depth reached on : 20th June 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"	167	847	Gel / Water
8½"	847	2552	KCl / PHPA / Polymer

Cased Hole

<u>Casing Diameter (inch)</u>	<u>Casing Type</u>	<u>Shoe Depth (m)</u>
9 ⁵ / ₈ "	Surface	842
7"	Production	2547

Revision	Date	Issued by	Approved by	Remarks
1	25-06-2001	Geoservices Unit 95	Base Mudlogging Coordinator	

MUD LOGGING

Logging Unit Number: 95

Engineers: M. Smith, M. Boyd, G. Doczy, P. Misquitta

Sampling Interval

Sample Type	Number of sets	Quantity per set	Sampling interval	From (m)	To (m)
Washed & Dried	3	100 grams	10 metres	2200	2350
	3	100 grams	5 metres	2350	2552

Cuttings Distribution

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

Revision	Date	Issued by	Approved by	Remarks
1	25-06-2001	Geoservices Unit 95	Base Mudlogging Coordinator	

WELL SUMMARY

West Tuna W-22 was a new well, drilled from unused conductor W-22, with a primary objective of the M-1 sands on the Western flank of the Tuna Structure. The proposed deviated well was to be drilled to a total depth of 2486 m MDRT (1451 m TVDRT) in the 8½" hole, with a single oil completion string of 4½" tubing in 7" production casing.

West Tuna W-22 was kicked off at 23:20 hrs on 5th June 2001 at 167m, from the W-22 conductor. A 12¼" steerable assembly, with a Reed-Hycalog DS195 PDC bit was used to drill the first phase. The string was pulled at 199m, 599m and 628m, due to MWD problems. The Final depth for this section was 847m. The 9⁵/₈" casing was run and cemented at 842m. A 8½" LWD/MWD rotary assembly with a Geodiamond S75HPX bit was made up and run to 250m, where 222.21 metres of drill string dropped downhole. This was fished out and a replacement assembly was made up.

The 12¼" phase was drilled with a Gel / Water mud system. A mud weight of 9.5 ppg was maintained by dilution with water and prehydrated Gel. The cement was drilled out with seawater before displacing to a KCl/PHPA/Polymer mud system with an initial mud weight of 9.0 ppg. 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-22 reached a total depth of 2552m (1451m TVD) at 05:00 hrs on 20th June 2001. The final survey at a depth of 2552m had an inclination of 76.02 deg and an azimuth of 286.10 deg.

A 7" Production was run to a depth of 2547m. West Tuna W-22 was completed as a single Oil string with 3½" completion tubing run to 2315m. West Tuna W-22 was handed over to Production on 30-06-2001.

Revision	Date	Issued by	Approved by	Remarks
1	25-06-2001	Geoservices Unit 95	Base Mudlogging Coordinator	

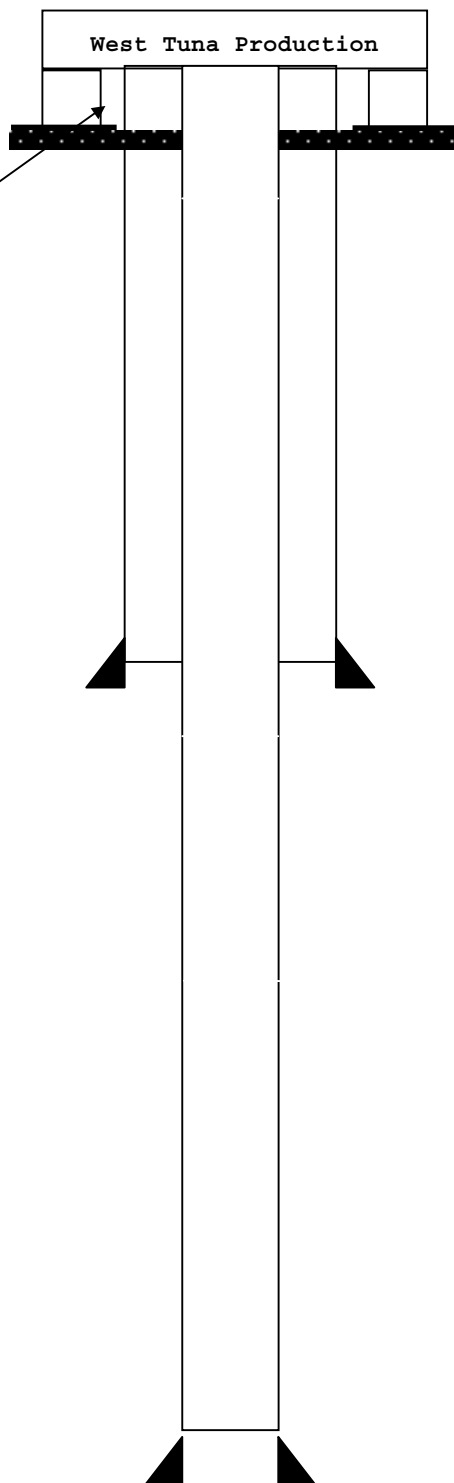
WELL PROFILE

Rotary Table to Mean Sea Level

34.69 m

Rotary Table to Sea Bed 61.00 m

Existing conductor shoe at 167m



Nabors Rig 453

Kick-off W-22

5 June 2001

From 167m

Mud Weight 9.0- 9.5 ppg

9⁵/₈" Surface Casing at 842m

12¹/₄" hole to 847m

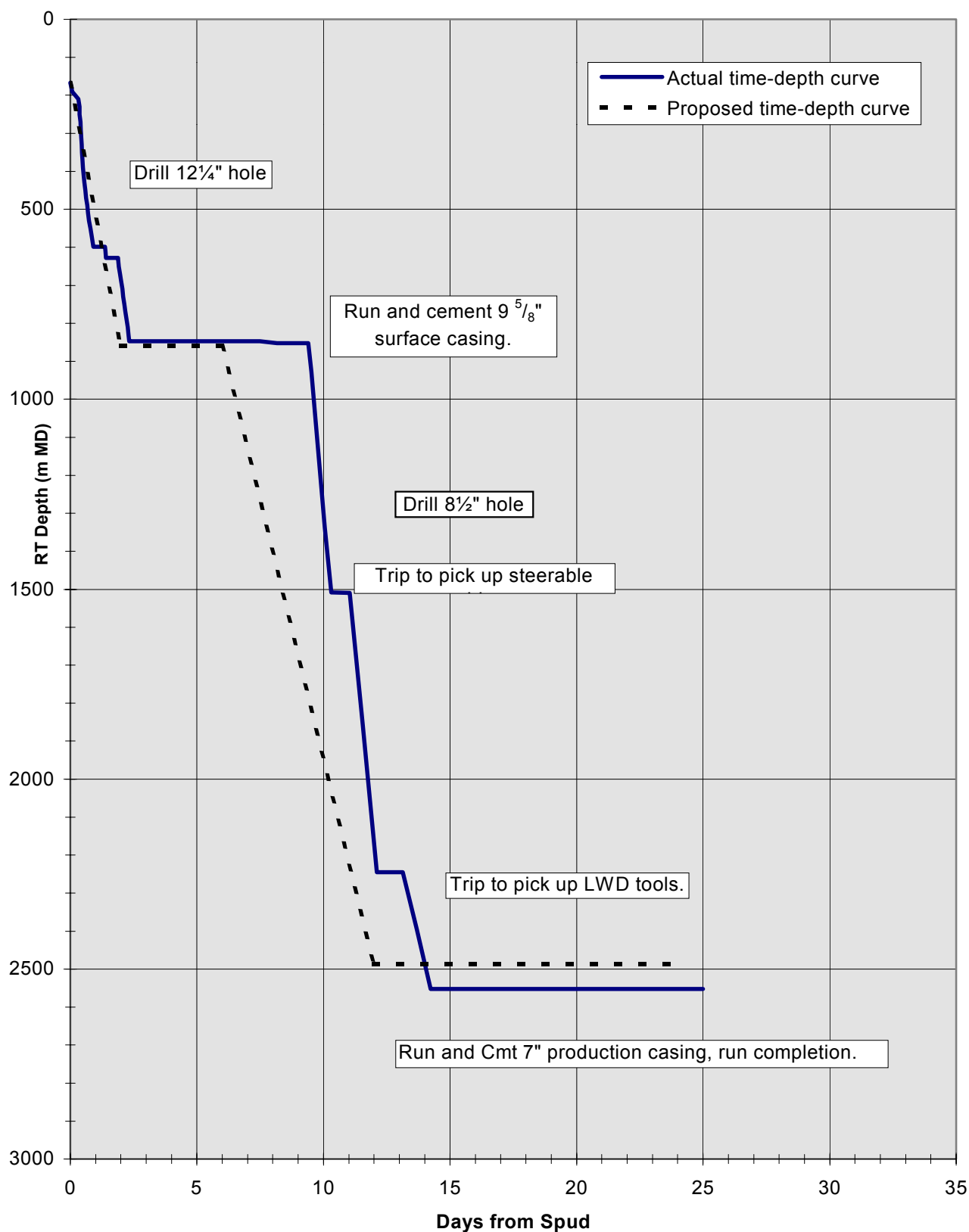
Mud Weight 9.5-10.3 ppg

7" Production Casing at 2547 m

8¹/₂" Hole drilled to 2552m

Revision	Date	Issued by	Approved by	Remarks
1	25-06-2001	Geoservices Unit 95	Base Mudlogging Coordinator	

WTN W-22 TIME-DEPTH CURVE (measured depth)



Revision	Date	Issued by	Approved by	Remarks
1	25-06-2001	Geoservices Unit 95	Base Mudlogging Coordinator	

BIT RUN SUMMARY

BIT	Size (")	Type	Jets	In (m)	Out (m)	Hours	Condition
1	12¼"	REED DS195	5x16	172	597	10.2	0-1-CT-G-X-IN-NO-DTF
1RR	12¼"	REED DS195	5x16	597	847	8.4	0-1-CT-G-X-IN-NO-TD
3	8½"	HUGHES MX20D	3x22	847	852	0.5	1-1-WT-A-EEE-IN-NO-BHA
2RR	8½"	GEODIAMOND	7x14	852	1509	10.38	1-1-NO-X-O-IN-NO-BHA
2RR2	8½"	GEODIAMOND	7x14	1509	2245	11.93	1-1-WT-A-IN-NO-BHA
2RR3	8½"	GEODIAMOND	7x14	2245	2552	21.39	1-2-CT-NT-X-1-TD

CASING DATA

Type	Size (Inches)	Weight (lb/ft)	Grade	Thread	Depth (mMDRT)
Surface	9 ⁵ / ₈ "	47	L - 80	LTC	Surface to 842m
Production	7"	26	L - 80	LTC	Surface to 2547m

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	Lead 700	14.6gal/10bbl Econolite 0.25gal/10bbl NF-5	Lead 198	Lead 275	Lead 12.5	Lead Surface to 540m	2000
		Tail 300	0.25 gal/10bbl NF-5	Tail 37.8	Tail 62	Tail 15.9	Tail 540.57 to 842.57	
7"	ABC Class G	Lead 712	32gal/10bbl HALAD 413L 2gal/10bbl SCR100L 0.5gal/10bbl NF5	89	146	15.8	1885 - 2548	2000

Revision	Date	Issued by	Approved by	Remarks
1	25-06-2001	Geoservices Unit 95	Base Mudlogging Coordinator	

WELL DIRECTIONAL PROFILE

(from Geoservices Software)

Revision	Date	Issued by	Approved by	Remarks
1	25-06-2001	Geoservices Unit 95	Base Mudlogging Coordinator	

WELL DIARY

5th June 2001	Continue to pick up and make up stands of drillpipe. Pick up and make up BHA. Run in hole with BHA, function test Anadrill MWD and circulate with sea water. Displace hole to mud. Spud West Tuna W-22 at 23:20 hrs. Drill 8m.
6th June 2001	Steer 12¼" hole from 175m to 190m. Trouble-shoot MWD problem. Steer from 190m to 198m, again working on MWD computer problem. Pull out of hole to re-program MWD computer. Make up BHA and run in hole. Wash last stand to bottom and slide from 198m to 225m. Work pipe while trouble-shooting MWD. Slide and rotate from 225m to 597m. Work string while trouble-shooting MWD failure. Pull out of hole with drillpipe.
7th June 2001	Continue to pull out of hole. Pick up spare MWD and make up BHA. Run in hole and wash from 541m to bottom. Steer ahead from 599m to 628m. Circulate while restoring power to Anadrill. Take survey, no change in angle. Pull out of hole for bot re-orientation. Run in hole and wash to bottom. Steer and rotate 12¼" hole from 628m to 695m.
8th June 2001	Rotary drill 12¼" hole from 695m to 847m, maintaining angle. Circulate bottoms up. Flow check, slug pipe and pull out of hole. Rack back heavy weight drillpipe and MWD in derrick. Lay out DCs, motor and break bit. Clear floor and rig up to run 9 5/8" casing. Run shoe track.
9th June 2001	Continue to run 9 5/8" casing to depth. Rig up cement head and pressure lines. Circulate casing and pressure test, 300-3000 psi. Cement as per program. Displace with rig pumps, hold 350 psi for 15 minutes, float holds. While waiting on cement, nipple down diverter and clean pits. Slack off weight and rig down cement head. Lift diverter and cut casing stump.
10th June 2001	Cut casing at diverter. Layout diverter and cut casing at conductor. Dress conductor and prepare to well head to weld on Bradenhead. Rig up and rotate BOPs. Skid rig. Position BOP trolley under BOPs and rig up rams to lifting frame. Rig up BOP lifting cradle. Weld and x-ray Braidenhead. Nipple up BOPs.
11th June 2001	Heat treat Braidenhead. Remove lower emergency kill V/V from BOPs and blind flange. Rig up and test blind rams. Skid rig. Remove BOP lifting frame. Pick up high pressure riser and land out n Braidenhead. Lift and install BOPs, kill and choke lines, bell nipple and rotary table drip pan. Function test Koomey unit.
12th June 2001	Make up and run test assembly. Test lines 300/3000 psi. Test BOPs and choke manifold. Repair inner kill V/V. Complete testing of BOPs. Lay out test tool. Pick up and run wear bushing. Make up BHA and run in hole on heavy weight. Lost string. Run one stand of heavy weight on drillpipe and fish out string. Lay out dropped heavy weight drillpipe.
13th June 2001	Continue to lay out heavy weight drillpipe and Anadrill tools - download source. Make up bit and BHA. Run in hole to 520m, cut and slip line. Tag cement at 564m. Drill out cement to 731m.
14th June 2001	Continue to drill cement from 731m to 816m, tag float collar. Circulate bottoms up; rig up and pressure test casing to 2000 psi for 15 minutes. Drill cement from 816m through shoe at 842m to 847m. Drill new hole from 847m to 852m. Circulate hole clean and displace to hole mud. Pull back to 830m and conduct PIT. 8.8 ppg @ 420 psi = 12.5 ppg EMW. Pull out of hole.
15th June 2001	Make up BHA to 249m. Run in hole on drillpipe to 828m. Break circulation and wash to bottom. Rotary drill 8½" hole from 852m to 1337m.
16th June 2001	Drill from 1337m to 1509m. Circulate hole clean from 1509m to 1453m. Flow check. Pull out of hole to 820m and circulate hole clean. Flow check. Pull out of hole to BHA and rack back heavyweight drillpipe. Change tools. Run in hole, filling every 10 stands. Wash from 1424m to TD.

Revision	Date	Issued by	Approved by	Remarks
1	25-06-2001	Geoservices Unit 95	Base Mudlogging Coordinator	

17th June 2001	Slide, rotate and survey 8½" hole from 1509m to 2205m.
18th June 2001	Slide, rotate and survey 8½" hole from 2205m to 2245m. Clean hole while pulling back to 2205m. Slug pipe and flow check. Pull out of hole to shoe and flow check. Pull out of hole and change BHA - pick up LWD. Run in hole to shoe; slip and cut. Continue to run in hole to 1817m. Tight hole at 1403m, 1428, and 1582m.
19th June 2001	Continue to run in hole from 1817m, tight at 1841m. Wash last 2 stands to bottom. Take check survey. Drill and LWD log 8½" hole from 2245m to 2482m. Flow check at 2337m - static
20th June 2001	Continue to drill and LWD log 8½" hole from 2482m to TD @ 2552m. Wiper trip, POOH, lay down MWD tools, change rams to 7" and prepare to test BOPs.
21st June 2001	Test BOPs and prepare to rig up to run casing, rig service, wait on weather. Run in hole for wiper trip.
22nd June 2001	Continue to RIH for wiper trip. Wash into hole from 2000m to TD @ 2552m. Circulate x 2 the annular volume adjacent to the Latrobe. POOH from 2552m to 2439m. Wash into hole from 2439m to 2552m. Condition mud and POOH to 2323m. Circulate, condition mud and clean hole. POOH to 794m. Condition mud, flow check and POOH. BOP drill @ 594m. POOH, lay out 2 stabilisers and bit. Pull wear bushing and hold pre-casing JSA.
23rd June 2001	Service rig and RIH 7" casing to 644m and break circulation. Continue to run casing to 2547m. Rig up Cement Head and hold pre-cementing JSA. Reciprocate casing while circulate hole clean. Cement as per programme.
24th June 2001	Continue to cement 7" casing. Displace with Howco. Plug not bumped. Wait on cement. Clear rig floor of excess equipment and service rig. Bleed down cement head pressure - 2.25 barrels return. Hold JSA, nipple down riser "A" section and cement head lines in preparation to lift riser and install slips. Remove cement head and master bushings. Lift BOPs and riser and safety pin same. Set slips with 120 hook load and slack weight off string. Cut and dress 7" casing. While break down and lat out landing joints, rig down Weatherford. Lower riser and BOPs. Nipple down bell nipple, BOPs and riser. Lay out riser. Cameron prepares and installs "B" section and 2 wing valves. Test RX gasket, 7" casing hanger and P seals 3000 psi / 15 mins. Remove drill spools and redress riser. Commence change out upper and lower pipe rams and redress TDS to 3½" handling equipment. Change upper pipe rams to 2 ⁷ / ₈ " VBRs and lower pipe rams to 3½". Service rig.
25th June 2001	Install riser, BOPs, bell nipple and flow line. Pick up and make up cup tester assembly and Halliburton lines. Test BOPs and choke manifold as per Esso specs. Rig down and lay out test assembly. Test casing to 2000psi against blind rams. Run wear bushing. Break down running assembly. Test TDS to Esso specs. Pick up and make up 7" casing scraper BHA and RIH to 113m. RIH 3½" drillpipe to 857m. Slip and cut. Continue to run in hole 3½" drillpipe.
26th June 2001	Rack back 7 stands 3½" drillpipe from 2000 to 1799m. Continue to pick up 3½" drillpipe from 1799 to 2229m. Service rig. Continue to run in hole from 2229 to 2481m. Tag cement. Work scraper from 2260 to 2310m and 2415 to 2430m. Drill cement from 2481 to 2503m. Circulate 40bbl high viscosity pill to clean casing. Displace to inhibited brine. Pressure test casing to 2000 psi / 10 mins against Hydril. POOH and rack back 3½" drillpipe from 2503 to 1378m. POOH and lay out drillpipe.
27th June 2001	Continue to lay out 3½" drillpipe to 113m. POOH and lay out casing scraper BHA. Clear rig floor of excess equipment. Service rig. Rig up Schlumberger for gauge ring and junk basket run. RIH to 2484m and POOH. Rig up Schlumberger perforating guns, RIH and set at 2419.9m (Top shot at 2433.5m). POOH and rig up Weatherford 3½" tubing handling gear. Pick up and Make up Halliburton packer assembly. Schlumberger RIH with packer assembly and set at 2300m. POOH

Revision	Date	Issued by	Approved by	Remarks
1	25-06-2001	Geoservices Unit 95	Base Mudlogging Coordinator	

and rig down Schlumberger. Pull wear bushing and lay out. Rig up to run tubing and service rig.

28th June 2001	RIH with 3½" tubing to 1863m. Pick up TRSV, Halliburton instals control line. False general alarm, make up TIW to tubing and secure well. Continue RIH with tubing and control line to 1900m. Alarm; secure well. Continue RIH tubing to 2300m. Make up pump down sub, stab into packer and set down 10klb. Confirm landout, OK. Perform spaceout and make up tubing hanger.
29th June 2001	Test control line 4400psi / 15mins. Land hanger, energise and apply 10klb overpull; OK. Pick up and make up FOBV, side entry sub and hook up surface lines. Rig up wireline unit, sheaves and lubricator. Test 500 / 2300psi for 5mins. No go leaks in hose. Repair. Perform wirelining and testing as per ESSO programme.
30th June 2001	Continue to wireline and test completion string. Nipple down BOPs, riser and lay out same. Cameron terminates control line to tubing hanger. Install Christmas tree to "B" section and nipple up. Test upper tubing hanger seals, ring gasket and tubing hanger neck seals; 5000psi / 15mins. Rig up lubricator and BPV. Rig down and lay out lubricator and reinstall deck grating over W-22.

Revision	Date	Issued by	Approved by	Remarks
1	25-06-2001	Geoservices Unit 95	Base Mudlogging Coordinator	

Section 2

Geological Summary

Revision	Date	Issued by	Approved by	Remarks
1	25-06-2001	Geoservices Unit 95	Base Mudlogging Coordinator	

FORMATION TOPS

DESCRIPTION	MD (m) - RT	TVD (m) - RT
Top of LAKES ENTRANCE	1852.5m	1145.0m
Top of LATROBE GROUP	2345.0m	1380.8m
Top of COARSE CLASTICS	2358.5m	1386.4m
TOTAL DEPTH	2552.0m	1451.1m

GEOLOGICAL SUMMARY

167m - 390m

CALCARENITE**CALCARENITE:**

very light grey to light grey, light olive grey to light yellowish grey, occasionally dark grey, grading from coarse to fine grained from the top to the bottom of this interval, argillaceous in part, minor fossils and shell fragments, firm to moderately hard, trace ooids, fair to good visual porosity, no fluorescence.

390m - 450m

CALCISILTITE**CALCISILTITE:**

very light grey to light grey to light yellowish grey, arenaceous, firm to hard, trace fossils, rare ooids, traces of minor dark grey lithic fragments.

450m - 810m

CALCARENITE with a thin stringer of CALCISILTITE at the bottom of this interval.**CALCARENITE:**

light yellowish grey to very light grey, medium light grey in part. fine to medium grained, commonly argillaceous, abundant fossil fragments, traces of disseminated pyrite, traces of lithic fragments and glauconite, trace calcite grains, friable to moderately hard, poor visual porosity, no fluorescence.

CALCISILTITE:

light grey to yellowish grey, argillaceous, arenaceous in part, fossil fragments common, rare carbonaceous specks, firm to subblocky.

810m - 1852.5m

CALCILUTITE**CALCILUTITE:**

Grading from light olive grey to medium grey and olive grey from the top to the bottom of this interval, occasional traces of buff grey to medium dark grey, very argillaceous, slightly silty, occasionally grading to calcisiltite, trace fossils including forams, trace disseminated pyrite, rare traces of carbonaceous specks, rare glauconite and ooids, soft to occasionally firm at the top getting harder with depth, .

LAKES ENTRANCE FORMATION

1852.5m - 2345m

CLAYSTONE**CLAYSTONE:**

light olive grey to medium grey, medium grey to dark grey in parts, soft to occasionally moderately firm, moderately calcareous, trace fossil fragments and ooids, trace disseminated pyrite, trace carbonaceous specks and flakes, trace glauconite, locally silty, soft to occasionally firm, subblocky.

Revision	Date	Issued by	Approved by	Remarks
1	25-06-2001	Geoservices Unit 95	Base Mudlogging Coordinator	

LA TROBE FORMATION2345m - 2358.5m **CALCAREOUS CLAYSTONE with SILTSTONE and minor SANDSTONE**

CALCAREOUS CLAYSTONE: light olive grey to olive grey to brownish grey, locally silty, grading to siltstone, minor micromica in part, trace disseminated pyrite, minor glauconite, very soft to soft, locally firm, subblocky, locally amorphous.

SILTSTONE: dark yellowish orange, dark yellowish brown, very argillaceous, grading to claystone, abundant disseminated glauconite, very dispersive to very soft and amorphous, trace arenaceous and grading to fine sandstone, moderately hard, subblocky.

SANDSTONE: clear, translucent, trace light grey, medium to predominantly very coarse grained, moderately sorted, sub-angular to sub-rounded, loose, fair inferred porosity, no fluorescence.

COARSE CLASTICS2358.5m - 2552 m **SANDSTONE**

SANDSTONE: Clear to translucent, opaque, pale grey, trace milky, medium to very coarse grained, predominantly medium grained, moderately sorted, sub-angular to sub-rounded, locally trace pyrite cement, trace disseminated pyrite, minor fractured quartz grains, loose, fair to good inferred porosity.

FLUORESCENCE: 2395m - 2400m, Trace in argillaceous matrix, pale yellowish white spotted fluorescence, weak pale yellow crush cut, very thin residual ring.

2415m - 2430m, trace to 5%, dim pale yellowish green spotted fluorescence, weak crush cut, thin residual ring.

2430m - 2445m, 10% to trace dull bluish white spotted fluorescence, weak crush cut, thin residual ring.

Revision	Date	Issued by	Approved by	Remarks
1	25-06-2001	Geoservices Unit 95	Base Mudlogging Coordinator	

GAS REPORT

No gas was recorded while milling the window at 167m. Gas was first recorded at 397m, comprising only of Methane. This Gas, consisting of C₁, persisted right through the Calcisiltite section down to 1852m i.e. the top of Lakes entrance. The gas levels ranged from 8 to 50 units with an average of 20 to 25 units.

In the underlying Claystone from 1852m to the top of the LaTrobe formation at 2345m, the gas consisted predominantly of C₁, with very minor traces of C₂ and C₃. The trend of the gas curve matched the ROP and there were no significant gas peaks in this interval. The gas levels ranged from 25 to 110 units with the average being around 35 units.

On penetrating the LaTrobe Formation at 2345m, there was a marked increase in the gas levels, not only on magnitude but also in composition, indicating the first hydrocarbon bearing lithology. Drilling with a MW of 10.3 to 10.4 ppg, the background gas ranged from 70 to 140 units, consisting of gas components from C₁ to C₅. There were a few gas peaks in this interval, details of which are in the table below

No CO₂ or H₂S was detected while drilling West Tuna W-22.

Gas peaks through the Latrobe Group

Depth m	Total Gas units	C ₁ %	C ₂ %	C ₃ %	iC ₄ %	nC ₄ %	iC ₅ %	nC ₅ %
2368.5	265	3.44	0.21	0.12	0.02	0.04	0.01	0.01
2388	388	2.79	0.32	0.18	0.03	0.07	0.02	0.02
2397	427	2.14	0.25	0.16	0.03	0.05	0.02	0.02
2427.5	210	1.94	0.18	0.16	0.04	0.08	0.03	0.03

Revision	Date	Issued by	Approved by	Remarks
1	25-06-2001	Geoservices Unit 95	Base Mudlogging Coordinator	