



**TUNA A-10a**

**TUNA A-10a ST**

**FINAL WELL REPORT**

Prepared by

**Geoservices Overseas S.A.**

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Tuna A-10a ST	MASTERLOG --	1:500 scale from 1997 to 2243 metres 1:200 scale from 2070 to 2243 metres
Tuna A-10a ST	DRILLING LOG --	1:1000 scale from 1997 to 2243 metres
Tuna A-10a ST	GAS RATIO LOG --	1:200 scale from 2070 to 2243 metres

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## **Section 1**

### **General Well Summary**

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**WELL DATA**

Operator : Esso Australia Ltd  
Platform : Tuna  
Well name : Tuna A-10a and Tuna A-10a ST  
Country : Australia  
Location : Gippsland Basin  
Structure : Tuna M-1  
Field : Tuna  
Permit : Vic/ L9

Location AMG co-ordinates 5 774 222.49 mN 624 224.99 mE

Location local co-ordinates Lat: 38° 10' 16.394" S Long: 148° 25' 5.413" E

Target Local co-ordinates 862.5 mN 477.9 mW

Profile : Deviated  
Reference depth : Rotary Table  
RT to Seabed : 90.72 metres  
RT above M.S.L. : 31.32 metres  
Sea-water depth : 59.40 metres  
Proposed total depth : 2333 metres  
**Tuna A-10a**  
Actual total depth : 2312 metres  
True vertical depth : 1446.74 metres  
Spudded on : 5th October 2002  
Total depth reached on : 10th October 2002

**Tuna A-10a ST**  
Actual total depth : 2243 metres  
True vertical depth : 1455.44 metres  
Spudded on : 15th October 2002  
Total depth reached on : 16th October 2002

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

**Drilling Phases**

Diameter (inch)	From (m)	To (m)	Mud Type	
8½"	675.2	2312	KCl / Glycol / PHPA	(Tuna A-10a)
8½"	1997	2243	KCl / Glycol / PHPA	(Tuna A-10a ST)

**Cased Hole**

Casing Diameter (inch)	Casing Type	Shoe Depth (m)
20"	Conductor Shoe	167.4 MDKB (Existing)
13 <sup>3</sup> / <sub>8</sub> "	Surface	647.0 MDKB (Existing)
9 <sup>5</sup> / <sub>8</sub> "	Intermediate	661.2 MDKB (Existing)
7"	Production	2237.4 MDKB

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## MUD LOGGING

Logging Unit Number: 95

Engineers: R. Pereira, M. Smith, M. Boyd, G. Fawns

### Sampling Interval

#### Tuna A-10a

Sample Type	Number of sets	Quantity per set	Sampling interval	From (m)	To (m)
Washed and Dried	3	100 grams	10 metres	1980	2120
Washed and Dried	3	100 grams	5 metres	2120	2310

#### Tuna A-10a ST

Sample Type	Number of sets	Quantity per set	Sampling interval	From (m)	To (m)
Washed and Dried	3	100 grams	10 metres	1997	2070
Washed and Dried	3	100 grams	5 metres	2070	2240

### 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

Tuna A-10a is a conventional well designed to enhance well spacing and recovery in the north-eastern part of the M-1 reservoir. The well was drilled to a Total Depth of 2312 m MDRT (1446.7 m TVDRT) in 8½" hole. After logging analysis Tuna A-10a was plugged back and sidetracked. Tuna A-10a ST was drilled to a Total Depth of 2243 m MDRT (1455.4 m TVDRT) in 8½" hole and completed with a single oil completion string of 3½" tubing in 7" production liner.

**Tuna A-10a was spudded at 22:45 hours on 5th October 2002 after setting a whipstock in 9⅝" casing and milling a window.**

After skidding the rig from Tuna A-30, an EZ-SV was set at 750 m in the 9⅝" casing. The initial cut was made at 705 m, but was unable to circulate through annulus or retrieve the casing. A second cut was made at 605 m, however were unable to circulate or pull casing. The casing was cut and pulled at 487 m, 537 m, 569 m and finally at 617 m. Cement coating on the last two intervals indicated that the casing was cemented in down to; and below the 13⅜" casing shoe. A cement plug was laid on top of the EZ-SV and squeeze jobs conducted across the casing cut at 705 m and over the casing stump at 617 m. An RTTS packer was run, after failing to initially get a casing pressure test.

The cement was drilled out from 657 m to 668 m and a PIT conducted. A 9⅝" whipstock and milling assembly was run, but was unable to get passed 665 m. A scraper run was initiated to clean the hole of cement fill. The whipstock and mill was rerun to depth. After depth correlation and orientation, the whipstock anchor was set and the milling assembly was sheared off. The well was displaced to mud and the window was milled from 661.2 m to 675.2 m. A PIT was conducted at 660 m with 8.8 ppg mud (13.5 ppg EMW) to 520 psi.

An 8½" MWD steerable assembly was made up and run in the hole, passing through the casing window and reaming under gauge hole from 665 m to 675.2 m. The well was drilled from 675.2 m to a Total Depth of 2312 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.

**Tuna A-10a reached a Total Depth of 2312 m (1446.74 mTVD) at 04:30 hours on 10th October 2002.** The final survey at a depth of 2288.81 m had an inclination of 70.69° and an azimuth of 350.80°. Tuna A-10a was plugged back and sidetracked from 1997 m.

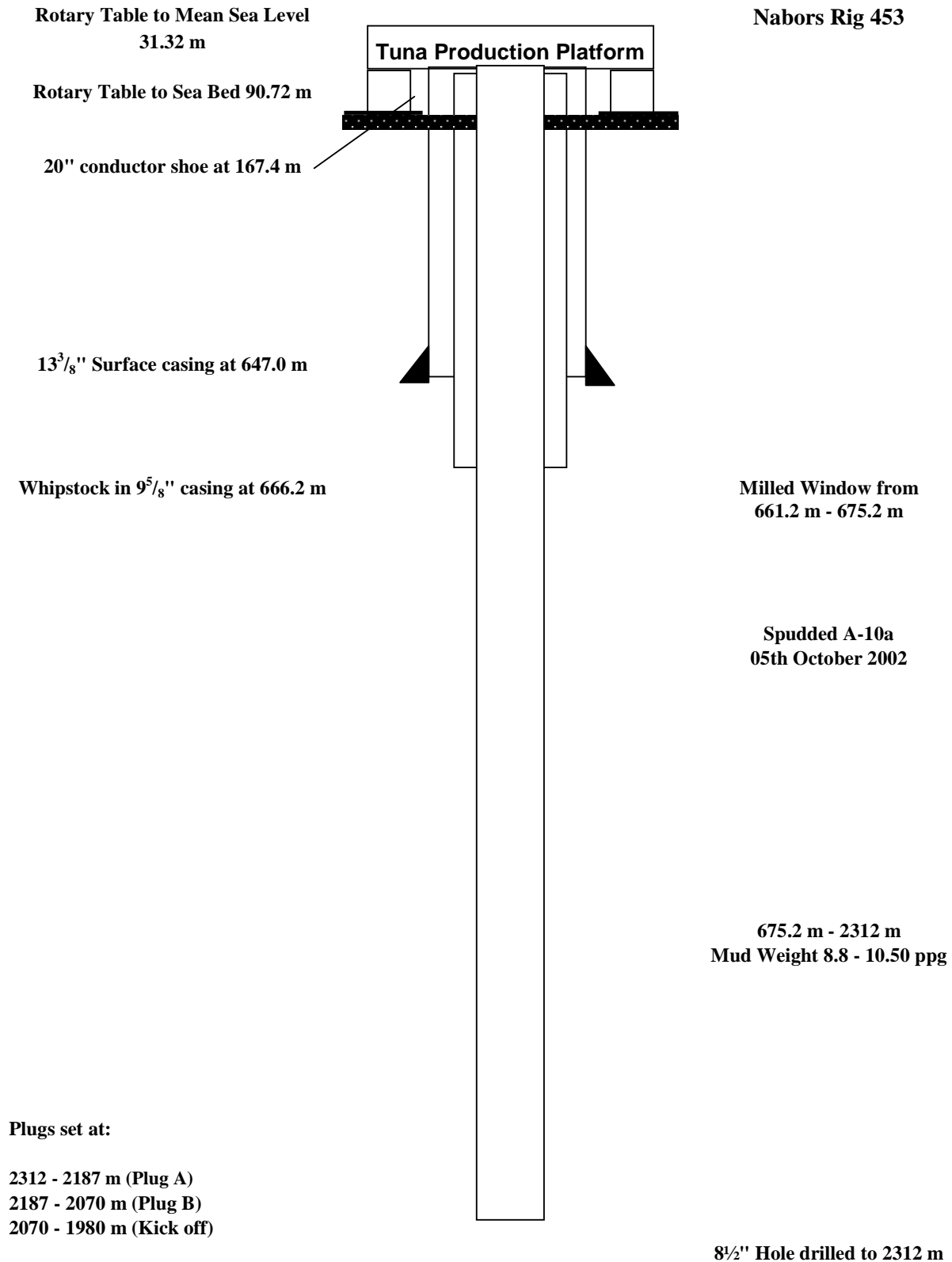
**Tuna A-10a ST was kicked off at 12:20 hours on 15th October 2002.**

After setting cement plugs an 8½" MWD steerable assembly was made up and run in the hole drilling cement from 1976 m to 1997 m where the sidetrack was kicked off. The well was drilled from 1997 m to a Total Depth of 2243 m with a mud weight of 10.1 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.

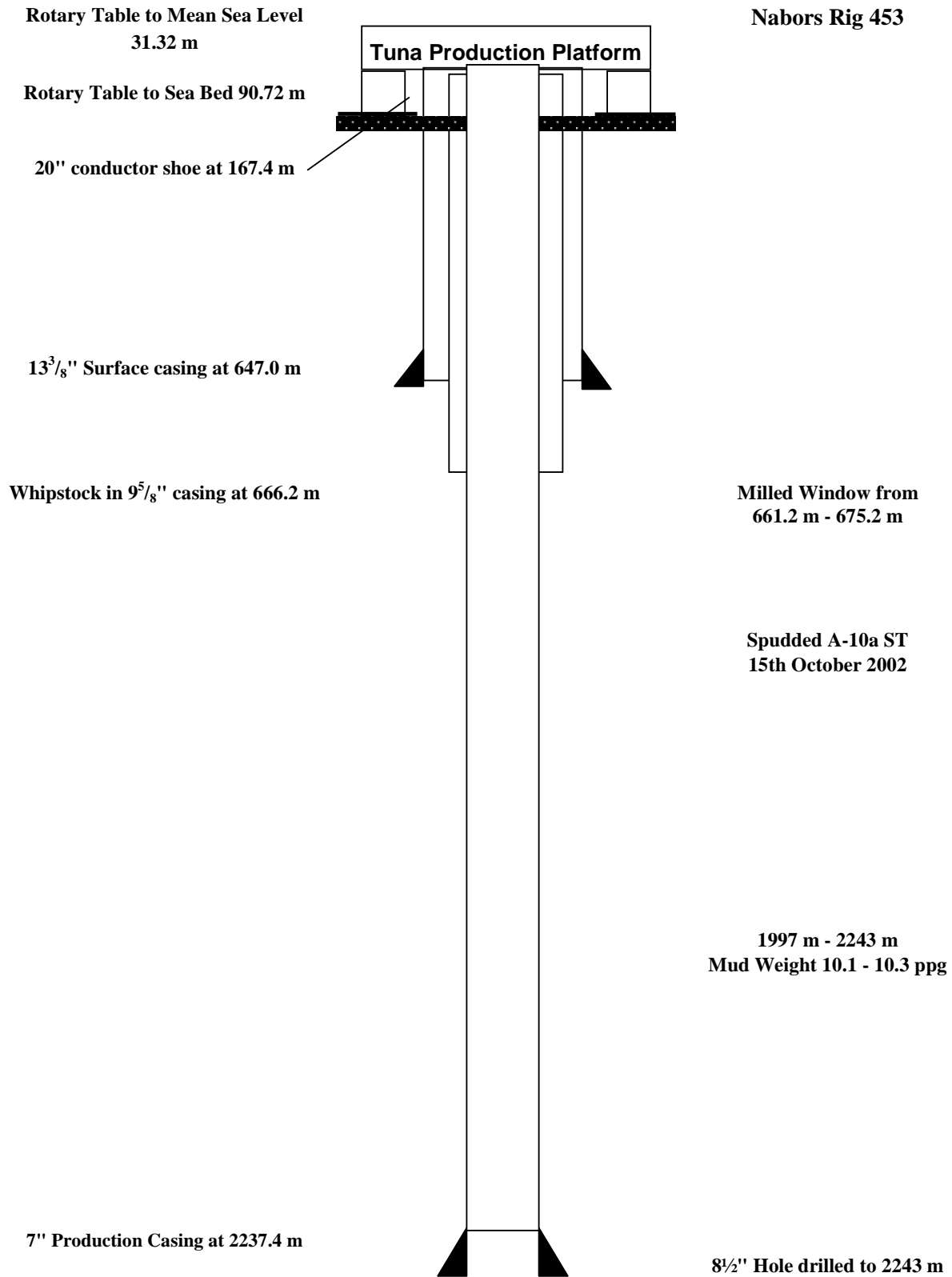
**Tuna A-10a ST reached a Total Depth of 2243 m (1455.44 mTVD) at 10:40 hours on 16th October 2002.** The final survey at a depth of 2224.38 m had an inclination of 57.39° and an azimuth of 349.38°. 7" production casing was run to a depth of 2237.4 m. Tuna A-10a ST was completed as a single oil string with 3½" completion tubing run to 2159.85 m and handed over to Production on 24-10-2002.

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## WELL PROFILE for Tuna A-10a



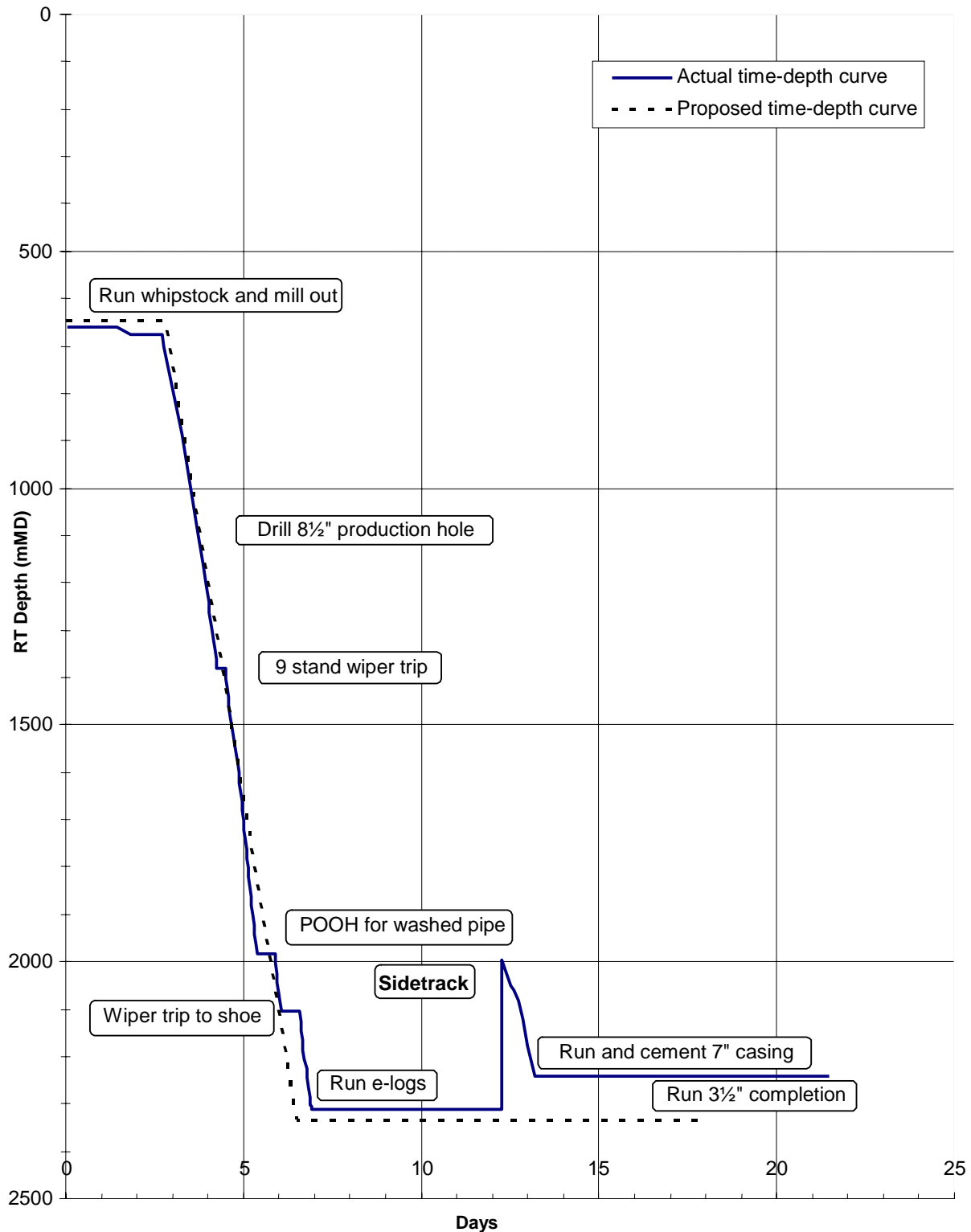
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**WELL PROFILE for Tuna A-10a ST**

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**TUNA A-10a & TUNA A-10a ST**  
**TIME-DEPTH CURVE (measured depth)**



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**BIT RUN SUMMARY**

Bit	Size (")	Type	Jets	In (m)	Out	Hours	Condition
1	8"	Watermelon Mill	N/A	661.2	675.2	8.63	N/A
2	8½"	Geodiamond S73HPX	8x15	675.2	2312	42.03	3-4-WT-A-X-IN-CT-TD
3	8½"	Security XS30D	3x22	1997	2243	15.0	4-4-WT-A-E/E-IN-TD

**CASING DATA**

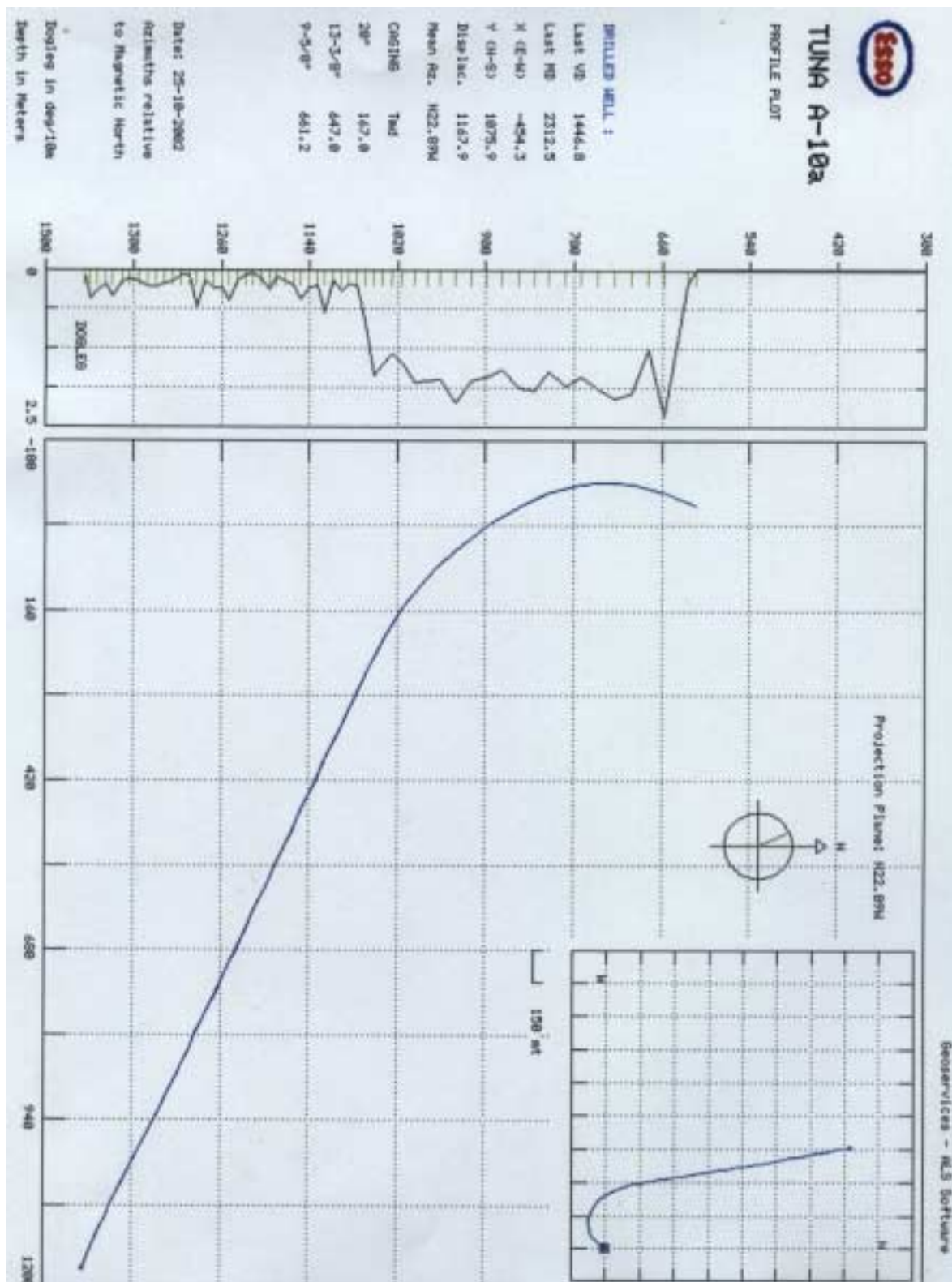
Type	Size (inches)	Weight (lb/ft)	Grade	Thread	Depth (mMDRT)
Conductor	20"	133	K-55	BTC	167.4
Surface	13 <sup>3</sup> / <sub>8</sub> "	54.5	K-55	BTC	647.0
Intermediate	9 <sup>5</sup> / <sub>8</sub> "	40	J-55	BTC	661.2
Production	7"	26	L-80	BTC	2237.4

**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)
KICKOFF PLUG	G	158.9	CFR-3L 12gal/10 bbls SCR100 1gal/10 bbls	16.6	30	16.5	1980 m to 2070 m	
PLUG B	G	194	CFR-3L 5gal/10 bbls SCR100 1gal/10 bbls	24	40	15.8	2070 m to 2187 m	
PLUG A	G	194	CFR-3L 5gal/10 bbls SCR100 1gal/10 bbls	24	40	15.8	2187 m to 2312 m	
7"	G	460	HALAD 413L 32gal/10 bbls  SCR 1gal/10 bbls  CFR 3L 5gal/10 bbls  NF-5 0.25gal/10 bbls	57	95	15.8	1677.3 m to 2237.4 m	2000

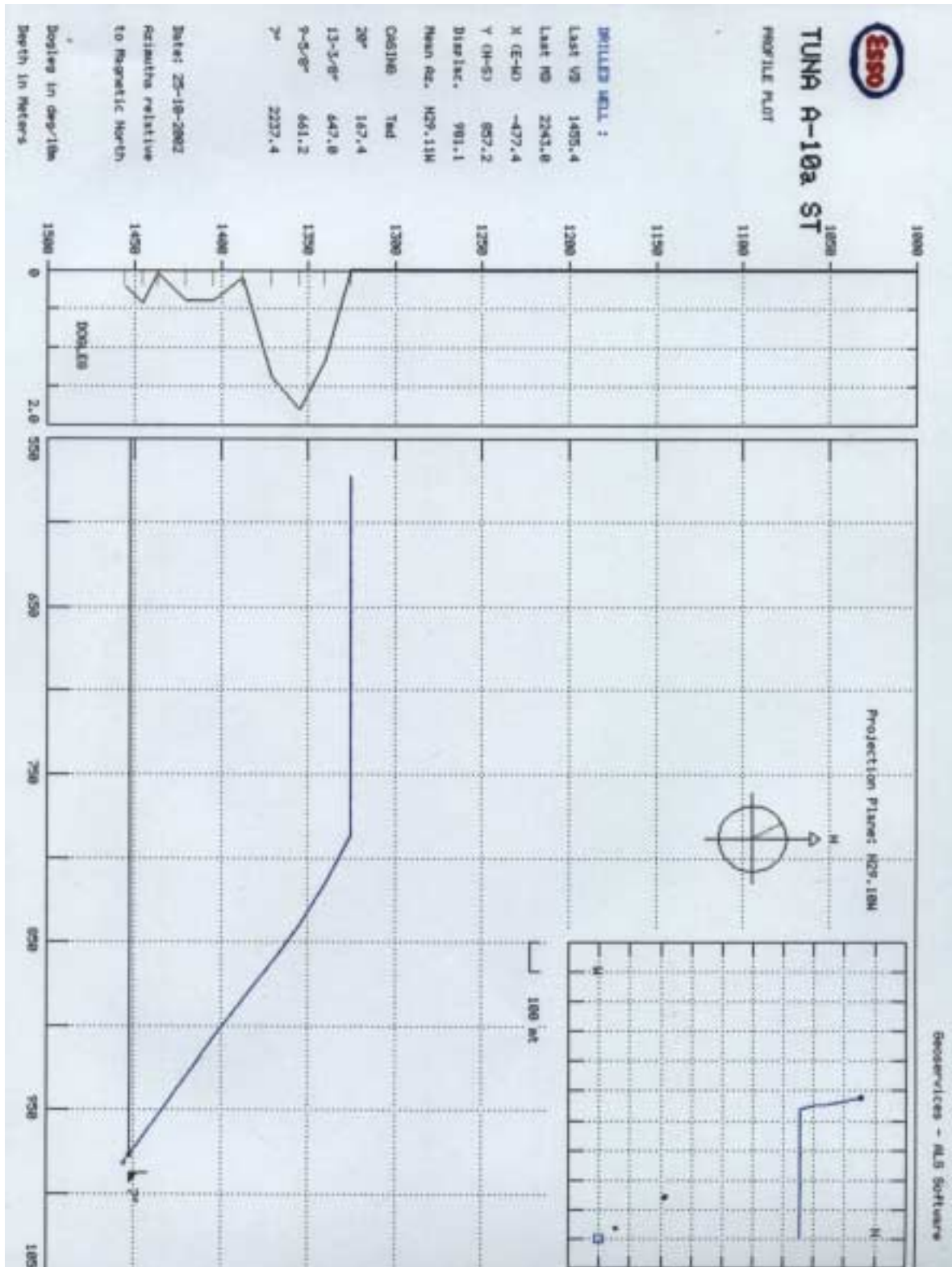
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**WELL DIRECTIONAL PROFILE for Tuna A-10a**  
(From Geoservices ALS Software)



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**WELL DIRECTIONAL PROFILE for Tuna A-10a ST**  
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**WELL DIARY**

<b>3rd October 2002</b>	Complete plug and abandon program for Tuna A-10 and start Tuna A-10a development well program. Pick up and make up 9 <sup>5</sup> / <sub>8</sub> " whipstock assembly and run in hole with HWDP to 236m. Run in hole with 5" drill pipe from 236 m to obstruction at 665 m. Pull out of hole with whipstock from 665 m to 26 m. Break down and lay out whipstock and mill assembly. Make up 9 <sup>5</sup> / <sub>8</sub> " casing scraper assembly and run in hole to 665 m. Tag cement. Circulate hole clean with 20 bbls Hi-vis sweep. Wash and ream cement from 665 m to 668 m. Spot 15 bbls Hi-vis pill and pull out of hole to 616 m. Make up reverse circulating head. Reverse circulate hole clean. Run in hole with singles. Reverse circulate hole clean at 627 m, 637 m, 645 m, 655 m and 668 m. Find 0.40 m of fill at 668 m. Pull out of hole from 668 m to 618 m.
<b>4th October 2002</b>	Rig service while waiting on fill to settle. Run in hole to 668 m, no fill. Reverse circulate clean, spot Hi-vis and pull out of hole to 610 m. Reverse circulate Hi-vis sweep. Pull out of hole from 610 m to 199 m. Rack back HWDP from 199m. Lay out 9 <sup>5</sup> / <sub>8</sub> " casing scraper assembly. Pick up and make up 9 <sup>5</sup> / <sub>8</sub> " whipstock/mill assembly. Run in hole to 668 m. Tag top of cement. Space out whipstock for orientation. Rig up Schlumberger wireline. Run in hole with gyro, orientate whipstock and pull out of hole with gyro. Set whipstock anchor and shear mill from whipstock. Displace well to 8.8 ppg mud. Mill window from 661.2 m to 671.5 m.
<b>5th October 2002</b>	Mill window from 671.5 m to 675.2 m, ream through window. Flow check. Circulate hole clean with Hi-vis sweep (20 bbls). Conduct PIT at 660 m with 8.8 ppg mud to 13.5 ppg EMW (520 psi). Pump slug. Pull out of hole from 660 m to 226 m. Flow check. Rig service. Continue to pull out of hole with mill assembly and rack back HWDP from 226 m to 8 m. Attempt to free BHA from BOP stack, no go. Inspect rams. Remove and inspect UPRs, VBRs. Install same, reconfigure wear bushing and remove from BOP stack. Break down and layout milling assembly. Jet stack and wellhead, function test BOP rams from remotes. Make up test assembly and run in hole with same. Pressure test LPRs and UPRs. Break down and lay out test assembly. Make up 8½" steerable BHA, SHT motor and rack back in mast. Make up combination. tool and run wear bushing. Pick up BHA from mast, Anadrill orientate and run in hole to 177 m. Continue to run in hole with 5" DP from 177 m to 605 m. Orientate toolface. Run in hole to 617 m, enter 9 <sup>5</sup> / <sub>8</sub> " casing and run in hole to 665 m. Ream 8" rathole from 665 m to 675 m. Drill, steer and survey 8½" hole from 675 m to 690 m.
<b>6th October 2002</b>	Drill, steer and survey 8½" hole from 690 m to 1102 m.
<b>7th October 2002</b>	Drill, steer and survey 8½" hole from 1102 m to 1381 m. Circulate hole and backream to 1122 m, run in hole and continue to drill, steer and survey hole to 1532 m.
<b>8th October 2002</b>	Continue to drill, steer and survey 8½" hole. Pull out of hole looking for suspected wash in pipe. Locate wash in pipe at 985 m and continue to pull out of hole to shoe to slip and cut drilling line. Run in hole.
<b>9th October 2002</b>	Continue to run in hole. Wash last stand to bottom. Drill, steer and survey hole to 2105 m. Circulate hole clean and pull out of hole. Pull back to shoe and perform rig service. Run in hole, washing last stand to bottom, circulate to condition mud to 10.3 ppg. Drill 8½" hole to 2220 m.
<b>10th October 2002</b>	Continue to drill 8½" hole to 2312 m (TD) at 04:30 hrs. Circulate hole and work pipe back to 2250 m. Pull out of hole to Top of Latrobe at 2105 m. Circulate hole clean and flow check. Pull out of hole, rack back pipe, lay out jars and make up cleanout BHA. Run in hole.
<b>11th October 2002</b>	Continue to run in hole with cleanout assembly. Reach TD and circulate Latrobe volume twice. Pull out of hole to 2055 m and circulate bottoms up. Continue to pull out of hole 1962 m. Monkey board damaged, circulate and wait on daylight to inspect. Make safe and pull out of hole to 777 m. Circulate hole clean and pump through window. Continue to pull out of hole, rack back BHA. Make up BHA for logging run.

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<b>12th October 2002</b>	Make up BHA and run in hole with Reeves logging tools. Wash from 2235 m to TD at 2312 m. Pump out of hole to 2235 m. Establish circulating rates, use Halliburton cementing pumps to pump down messenger dart. Engage release mechanism. Pump out logging tools and log out of hole from 2307 m to 1968 m. Flow check, pump slug and pull out of hole from 1968 m. Lay out Reeves logging tools and make up cleanout BHA.
<b>13th October 2002</b>	Continue to make up cleanout assembly, run in hole to shoe and slip and cut drilling line, wait on logs, install fish plates to monkey board. Pump slug, flow check and pull out of hole from 606 m. Wait on weather. Continue to pull out of hole, break and lay out cleanout assembly. Wait on weather. Pick up 3½" cement stinger. Run in hole with 5" drill pipe. Circulate in hole and pump cement plugs as per program.
<b>14th October 2002</b>	Set three cement plugs as per program. Pull out of hole. Make up new BHA and rack back. Pressure test BOP.
<b>15th October 2002</b>	Break down test assembly and re-run wear bushing. Make up bit, set bend in motor, initialise RAB and ADN tool and run in hole to 1880 m. Wash and ream from 1880 m to top of cement at 1976 m. Ream cement from 1976 m to 1997 m and kick off sidetrack at 1997 m. Drill, slide and survey ahead to 2082 m
<b>16th October 2002</b>	Drill, slide and survey ahead from 2082 m to TD at 2243 m. Circulate hole clean and rack back to 2140 m. Pull out of hole from 2140 m to 750 m and circulate hole clean. Run in hole to 2243 m washing and reaming last two stands. Circulate hole clean while backreaming from 2243 m to 2050 m. Circulate hole clean while racking back 1 stand / 30 minutes from 2050 m to 1983 m.
<b>17th October 2002</b>	Pull out of hole. Download ADN and RAB and lay out. Pick up drill collars and lay out. Make up wear bushing running tool and pull wear bushing. Make up jetting assembly and jet BOP and wellhead. Lay out assembly. Clear floor and rig up to run 7" casing. Run in hole with 7" casing.
<b>18th October 2002</b>	Continue to run 7" casing and cement as per program. Wait on cement. Rig down flow trough return lines and clean pits. Lay out 3½" drill pipe. Rig down cement head and change out bails. Rig to and lift BOP and riser and secure same. Cameron centralise casing at wellhead. Furmanite cut and dress casing.
<b>19th October 2002</b>	Furmanite cut and dress casing. Cameron install "B" Section, wing valves and pressure test upper void. Nipple down DSA flange, Riser, BOP, bell nipple and return lines. Function test koomey panels. Rig to and change out saver sub on TDS from 5" to 3½". Make up test assembly and pressure test LPR, UPR and 3½" TIW valve. Pull out of hole with test assembly and test blind rams. Run in hole and set test plug in "B" Section, pull out of hole and break down test assembly. Clear rig floor, rig to and lay down 5" drill pipe from derrick. Wait on weather.
<b>20th October 2002</b>	Wait on weather. Continue to lay out 5" drill pipe. Pull no-go test plug. Make up combination tool, run wear bushing and lay out tool. Make up 7" casing scraper assembly and run in hole with 3½" drill pipe.
<b>21st October 2002</b>	Continue to run in hole with 7" casing scraper assembly to 2155 m. Work scraper from 2155 m to 2126 m and wash from 2155 m to 2207 m. Ream cement from 2207 m to 2212 m. Pump sweep, displace well to sea water and circulate clean. Displace well to 9.0 ppg inhibited brine. Pull out of hole to 2165 m, pressure test casing to 2500 psi and continue to pull out of hole and lay out scraper assembly. Pull wear bushing, seat no-go test plug in "B" section. Lay out 5" heavy weight drill pipe and 5" drill pipe from derrick. Make up and run in hole with perforating guns.

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<b>22nd October 2002</b>	Continue to run in hole with perforating guns to the packer setting depth at 2130 m. Run in hole with Schlumberger correlating tool to 2120 m, pull out of hole with same and drop ball. Howco set packer, pull out of hole from 2130 m to 2070 m. Howco shear ball seat. Pull out of hole with 3½" drill pipe and lay out sideways to 861 m. Pull out of hole and rack back 3½" drill pipe from 861 m, lay out packer setting tool, retrieve wear bushing and jet well head. Rig up and run 3½" tubing packer.
<b>23rd October 2002</b>	Continue to run in hole with 3½" completion string. Wash over top of packer, sting into same and confirm. Make up pup and hanger joints and land out completion string.
<b>24th October 2002</b>	Rig down flow line, bell nipple and BOP's. Terminate control line, nipple up Xmas tree and pressure test upper void and Xmas tree. Pressure test tubing and annulus and replace deck plate to Tuna A-10a. Rig released at 17:00 hrs. Prepare to skid rig to Tuna A-11.

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## **Section 2**

### **Geological Summary**

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**FORMATION TOPS for Tuna A-10a**

DESCRIPTION	MD (m) RT	TVD (m) RT	TVD (m) SS
Top of Gippsland Limestone	Not Applicable		
Top of Lakes Entrance	1441	1116.1	1084.8
Top of Latrobe Group	2105	1368.8	1337.5
Top of Coarse Clastics	2167	1394.3	1363.0
<b>TOTAL DEPTH</b>	2312	1446.7	1415.4

**GEOLOGICAL SUMMARY for Tuna A-10a****GIPPSLAND FORMATION:**

660 m - 990 m      **CALCISILTITE and CALCILUTITE**

**CALCISILTITE:** Light to medium grey, light brownish grey to brownish grey, occasionally light yellowish grey, grades to Calcilutite, common to trace fossil and calcite fragments, occasional carbonaceous specks and lithic specks, trace disseminated pyrite, soft to firm, sub-blocky to amorphous.

**CALCILUTITE:** Very light grey to light grey, light brownish grey, occasionally medium grey, grading to Calcareous Claystone, trace fossil fragments, trace carbonaceous specks, trace calcite grains, trace disseminated pyrite, soft to firm, occasionally dispersive in part, sub-blocky to amorphous.

990 m - 1050 m      **CALCILUTITE grading to MARL**

**CALCILUTITE:** Medium olive grey, light grey to light brownish grey, argillaceous and grading to Calcareous Claystone, trace disseminated pyrite, trace Calcite and fossil fragments, soft to firm, sub-blocky to amorphous.

**MARL:** Light brownish grey to light olive grey, occasionally pale yellowish brown, argillaceous, grading to Calcareous Claystone, common Ooids & Foraminifera, common disseminated pyrite, trace fossils fragments & carbonaceous specks, firm, occasionally moderate hard in part, sub-blocky to blocky.

1050 m – 1380 m      **MARL**

**MARL:** Olive grey to medium dark grey, medium light grey to medium grey, argillaceous, grading to Calcareous Claystone, common Ooids, Foraminifera and other fossils fragments, trace to occasionally common disseminated pyrite, trace carbonaceous and lithic specks, soft to firm, occasionally moderately hard, sub-blocky.

1380 m - 1441 m      **MARL grading to CALCAREOUS CLAYSTONE**

**CALCAREOUS CLAYSTONE:** Light olive grey to olive grey, medium dark grey, occasionally medium grey, common veins of disseminated pyrite, trace Foraminifera, Ooids and fossils fragments, soft to firm, moderately hard in part, sub-blocky to sub-fissile, occasionally blocky.

**MARL:** Medium to light olive grey to medium grey, argillaceous, grading to Calcareous Claystone, trace Ooids, trace fossil fragments, trace lithic specks, soft to firm, sub-blocky to blocky.

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**LAKES ENTRANCE FORMATION:**

1441 m - 2105 m

**CALCAREOUS CLAYSTONE****CALCAREOUS CLAYSTONE:**

Light to medium olive grey, light to medium grey, occasionally silty, common Foraminifera and Ooids, trace pyrite replacement of Foraminifera, trace veins of disseminated pyrite, trace glauconite, trace carbonaceous specks and lithics, soft to firm, moderately hard in part, sub-blocky to sub-fissile, blocky.

**LATROBE FORMATION:**

2105 m - 2167 m

**Interbedded CLAYSTONE, SILTSTONE and SANDSTONE****CLAYSTONE (1):**

Pale yellowish orange to greyish orange, trace carbonaceous specks and occasional glauconite, very soft to dispersive, amorphous.

**CLAYSTONE (2):**

Pale brown to light brown grey in part, minor glauconite, trace very fine arenaceous in part, grading to Siltstone in part, trace carbonaceous specks, minor disseminated pyrite, very soft, sub-blocky.

**SILTSTONE:**

Light grey to greenish grey, argillaceous and grading to Claystone, trace very fine arenaceous, trace glauconite, rare disseminated pyrite, soft to firm, sub-blocky to sub-fissile.

**SANDSTONE:**

Moderate yellowish brown to moderate brown, occasional dark yellowish orange, very fine to fine, well sorted, sub-angular, trace weak sideritic cement, minor brown argillaceous matrix in part, minor nodular pyrite, minor glauconite grains, firm to moderately hard aggregates, poor visual porosity, no fluorescence.

**COARSE CLASTICS:**

2167 m - 2312 m

**SANDSTONE with minor SILTSTONE and CLAYSTONE****SANDSTONE:**

Translucent to clear, occasionally milky, predominantly medium, fine to very coarse, poorly sorted, sub-rounded to sub-angular, minor to locally common pyrite cement, minor nodular and disseminated pyrite, occasional hard dark grey lithic fragments, predominantly loose, good inferred porosity, fluorescence.

**FLUORESCENCE:**

2225 m - 2235 m, Trace even dull yellow fluorescence, no cut, no residue.

**SILTSTONE:**

Medium grey to medium dark grey, trace disseminated pyrite, very argillaceous grading to Claystone, firm, blocky.

**CLAYSTONE:**

Medium grey, weakly calcareous, grading to argillaceous Siltstone in part, very soft to soft, blocky.

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**FORMATION TOPS for Tuna A-10a ST**

DESCRIPTION	MD (m) RT	TVD (m) RT	TVD (m) SS
Top of Latrobe Group	2084	1366.4	1335.1
Top of Coarse Clastics	2126.5	1391.0	1359.7
<b>TOTAL DEPTH</b>	2243	1455.4	1424.1

**GEOLOGICAL SUMMARY for Tuna A-10a ST****LAKES ENTRANCE FORMATION:**1997 m - 2084 m **CALCAREOUS CLAYSTONE**

**CALCAREOUS CLAYSTONE:** Light olive grey, medium grey, minor silty in part, minor disseminated pyrite, trace Ooids and fossils, trace glauconite, trace carbonaceous specks and lithics, soft to firm, sub-blocky to blocky.

**LATROBE FORMATION:**2084 m - 2126.5 m **Interbedded CLAYSTONE, SILTSTONE and SANDSTONE**

**CLAYSTONE (1):** Pale yellow orange to grey orange, trace carbonaceous specks and occasional glauconite, very soft to dispersive, amorphous.

**CLAYSTONE (2):** Pale brown to light brown grey in part, pale yellow brown, trace very fine arenaceous and grading to Siltstone in part, trace glauconite and carbonaceous specks, minor disseminated pyrite, very soft to dispersive, sub-blocky to amorphous.

**SILTSTONE:** Light grey to green grey, medium grey, argillaceous and grading to Claystone, trace very fine arenaceous, trace glauconite, trace disseminated pyrite, soft to firm, sub-blocky to sub-fissile.

**SANDSTONE:** Yellow brown to brown, brown grey, occasional dark yellow orange, very fine to fine, occasional medium, well sorted, sub-angular to sub-rounded, trace weak sideritic cement, minor brown argillaceous matrix in part, minor nodular pyrite and glauconite, firm to moderately hard aggregates, poor visual porosity, no fluorescence.

**COARSE CLASTICS:**2126.5 m - 2243 m **SANDSTONE with minor SILTSTONE and CLAYSTONE**

**SANDSTONE:** Translucent to occasional clear, occasional milky, predominantly medium, fine to very coarse, poorly sorted, sub-rounded to sub-angular, minor to locally common pyrite cement, trace to locally minor white kaolinite matrix, common quartz overgrowths, minor nodular and disseminated pyrite, predominantly loose, fair to good inferred porosity, fluorescence.

**FLUORESCENCE:** 2165 m - 2185 m; Trace to 10% dull pale green spotted fluorescence, weak streaming cut, moderate thick film residue, only in white kaolinite matrix.

**SILTSTONE:** Medium grey to medium dark grey, brown grey, weakly calcareous, arenaceous and grading to very fine Sandstone, argillaceous and grading to Claystone in part, trace disseminated pyrite and glauconite, firm to moderately hard, sub-fissile to sub-blocky.

**CLAYSTONE:** Medium dark grey to medium grey, pale brown in part, weakly calcareous, grading to argillaceous Siltstone in part, trace disseminated pyrite, soft, sub-blocky.

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**GAS REPORT for Tuna A-10a**

Initial traces of background gas were first observed in the Gippsland formation at around 770 m. This gas consisted of C<sub>1</sub> (Methane) and remained below 7 units for the 8½" hole section of the Gippsland formation. The background gas levels, also remained below 7 units. In the Claystone of the Lakes Entrance formation there was little change in the gas trend or character until 1613 m where the background gas increased gradually to approximately 10 units at 1865m and then dropped below 7 units. Gas levels remained around 7 units until close to the top of the Latrobe formation.

On penetrating the Latrobe formation at 2105 m there was an increase in gas to 100 units. The composition of the gases also changed with an increase in heavier gases (C<sub>2</sub> to C<sub>5</sub>) indicating a hydrocarbon bearing lithology. On penetration of the first sandstone lithology of the Coarse Clastics a maximum of 72 units was recorded. This was the peak gas reading in the Coarse Clastics.

Gas levels gradually decreased over the remainder of the well until at Total Depth the gas levels were between 7 and 10 units. The composition of the background gas at this depth was mainly of the heavier gases (C<sub>2</sub> to C<sub>5</sub>). The comparatively low level of these gases however did not indicate a hydrocarbon bearing lithology and may have been due to residual heavy hydrocarbons in the circulating fluid.

Connection gas was detected from 2047 m to 2105 m at around 1 unit above background gas. After 2105 m the connection gases were masked by the increased gas readings in the Latrobe Formation.

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 Tuna A-10a.

**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> %
2115	77	0.52	0.04	0.02	0.00	0.01	0.00	0.00
2124	76	1.19	0.07	0.04	0.01	0.02	0.00	0.01
2133	72	1.23	0.08	0.05	0.01	0.02	0.01	0.01
2150	102	1.79	0.11	0.07	0.01	0.02	0.01	0.01
2164	20	0.15	0.02	0.02	0.00	0.01	0.01	0.01
2172.5	72	1.15	0.08	0.05	0.01	0.02	0.01	0.01
2184	32	0.33	0.04	0.04	0.01	0.02	0.01	0.01
2198	53	0.78	0.06	0.04	0.01	0.02	0.01	0.01
2217	20	0.09	0.02	0.02	0.00	0.02	0.00	0.00
2225	23	0.10	0.02	0.02	0.01	0.01	0.00	0.01
2227	27	0.14	0.03	0.03	0.01	0.02	0.01	0.01
2234	25	0.11	0.02	0.02	0.01	0.01	0.01	0.01
2244	15	0.06	0.01	0.01	0.00	0.01	0.00	0.01
2260	13	0.04	0.01	0.00	0.01	0.00	0.01	0.01
2283	7	0.02	0.01	0.01	0.00	0.00	0.00	0.00
2295	7	0.02	0.00	0.01	0.00	0.00	0.00	0.00

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**GAS REPORT for Tuna A-10a ST**

Gas levels were low during the drilling of the Lakes Entrance formation with a background level of 1.5 to 2 units and comprised of Methane only. On penetrating the Latrobe formation at 2084 m there was an increase in gas to 46 units. The composition of the gas also changed with an increase in heavier gases (C<sub>2</sub> to C<sub>5</sub>) indicating a hydrocarbon bearing lithology. On penetration of the first sandstone lithology of the Coarse Clastics a maximum of 114 units was recorded. This was the peak gas reading in the Coarse Clastics. After the oil water contact the gas levels gradually decreased. At Total Depth the gas levels were around 15 units.

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 Tuna A-10a ST.

**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> %
2094	29	0.67	0.02	0.01	-	-	-	-
2107	46	0.80	0.04	0.02	-	0.01	-	-
2135.5	114	1.50	0.11	0.06	0.01	0.02	0.01	0.01
2150	101	1.13	0.10	0.06	0.01	0.02	0.01	0.01
2163	106	1.20	0.10	0.06	0.01	0.02	0.01	0.01
2178	71	0.81	0.07	0.05	0.01	0.03	0.01	0.01
2198	41	0.40	0.03	0.03	0.01	0.02	0.01	0.01

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