ESSO AUSTRALIA LIMITED

BLACKBACK A-1A

FINAL WELL REPORT

Prepared By

Geoservices Overseas S.A.

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

Geoservices Overseas, S.A.
8/14-22 Farrall Road
Midvale, Perth
Western Australia 6056
Australia
Tel : (08) 9250-2010
Fax : (08) 9250-2715

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CONTENTS

Section 1

General Well Summary

Revision	Date	Issued by	Approved by	Remarks
1	01/02/99	Geoservices Unit 093	Base Mudlogging Coordinator	

WELL DATA

Operator	: Esso Australia
Platform	: SEDCO 702 (semi-submersible)
Well name	: Blackback A-1A
Country	: Australia
Location	: Gippsland Basin
Well Type	: Subsea Oil Development
Field	: Blackback

Local co-ordinates	Latitude = 148° 33' 11.274" E	Longitude = 38° 32' 31.677" S
AMG co-ordinates	X = 635 355.1 m E	Y = 5 732 873.4 m N

Profile	: 60.78° drop 3°/30 m, hold at 23.42°.
Reference depth	: Rotary Table (RT)
Elevation RT A.M.S.L.	: 25.9 metres
Sea-water depth	: 395.0 metres
Proposed total depth (MDRT)	: 3271.0 m MDRT (2926.0 m TVDRT)
Actual total depth	: 3272.0 m
True vertical depth	: 2926.3 m
12.25" Hole Spudded on	: 6 June 1999
TD reached on	: 22 June 1999

Drilling Contractor

Drilling Contractor	: Schlumberger Sedco Forex
Rig name	: SEDCO 702
Rig type	: Semi-Submersible

Drilling Phases

Diameter (inch)	From (m)	To (m)	Mud Type
36"	421 m	505 m	Seawater and High viscosity sweeps
26"	505 m	688 m	Seawater and High viscosity sweeps
17½"	688 m	1310 m	Gel Polymer
12¼"	1320 m	3272 m	Petrofree Synthetic Oil

Cased Hole

Casing Diameter (inch)	Casing Type	Shoe Depth (m)	Top Liner (m)
30"	Vetco- Surface	487 m	419 m
20"	Vetco	682 m	418 m
$13^3/_8$"	Buttress	1302 m	419 m
9 5/8"	Buttress	3262 m	419 m

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MUD LOGGING

Logging Unit Number : 93

Engineers : Paul McGilveray
Noel Elliott
Stan Willson

Mudlogging Engineers : Andy Philps
Cherie Clark-Moore

Cuttings Collection

Sample Type	Number of sets	Quantity per set	Sampling interval	From (m)	To (m)
Washed and Dried	3	100 grams	10 metres	3030	3170
	3	100 grams	5 metres	3175	3272

Cuttings Distribution

Company	Washed and Dried Sample
Esso Australia	1 set
Victoria Department of Energy and Minerals	1 set
Australian Bureau of Resources	1 set

N.B. 30 metre spot samples were collected from 1310 m to 3030 m.

WELL SUMMARY

This well, Blackback A-1A, began as Blackback A-1 which was sidetracked due to stuck pipe after drilling down to 4273 m (2695 m TVD). Blackback A-1 ST1 was kicked off at 3684 m and drilled down to 4695 m (2921 m TVD). This sidetrack was plugged back to the 13 3/8" casing shoe at 1302 m due to poor results in the productive zone. Blackback A-1A was kicked off at 1320 m with the aim of improving commercial prospects for the Blackback A-1 project.

Blackback A-1A was designed to be drilled as a build and hold directional well at 23.42° maximum angle. It was programmed to encounter the highly productive Cretaceous Latrobe Formation, and cut a 27 m core in the reservoir before drilling to TD of 3828 m MD, 2926 m TVD. An oil column thickness of 31 m in two zones was expected.

The exploration well Blackback-2 is the closest offset well located 2.2 km to the southwest of the A-1 surface location. Drilled as a vertical well to 3160 m in 1992, significant shows of oil and gas were encountered before Blackback-2 was plugged and suspended. Maximum MW was 9.5 ppg and the bottom hole temperature was 194°F. H2S was reported in the Terakihi-1 well 3 km to the north, with levels reaching 400 ppm from the formation fluid samples. CO2 levels have reached 0.35 % in the Blackback field and up to 0.13% was recorded in Blackback A-1A. Abnormal formation pressures and H2S were not encountered in the Blackback-2 well nor were they present in Blackback A-1A.

Blackback A-1A was drilled using the semi-submersible rig Sedco Forex 702 in 395 metres of water and was part of three subsea development wells on the Blackback structure, located in Bass Strait, Australia, license VIC L-20. The well was spudded on June 3rd 1999 and reached TD at 3272 m MDRT, 2926.3 m TVDRT on June 22nd 1999, a total of 19 drilling days. The well only encountered a disappointing 2 m oil column but the well was cased and completed for production.

36" hole and 26" hole for this well were completed in a batch drilling manner along with Blackback-A3 and Blackback-A2. After setting cement plugs in Blackback A-1 ST1 from TD at 4695.5 m to 4473 m and from the 13 3/8" casing shoe at 1302 m, Blackback A-1A was kicked off from 1320 m. Using a steerable assembly, 12¼" hole was drilled with a maximum rate of drop & turn of 1.34° per 10 m from an inclination of 56.12° and azimuth of 356.96° at the kickoff point to an inclination of 20.87° and azimuth of 110.40° at 2081 m from where hole direction was held to TD, with a final inclination of 26.29° and azimuth of 116.26° at 3255 m.

12¼" hole was drilled using eight bits including a 9 7/8" core bit. Penetration rates were slower but more consistent than those achieved in Blackback-A2. The most successful bit run was with a Security FJ2563 which drilled from 2078 m to core point at 3172 m at an average rate of 20.4 m/hr, slightly slower than the same section in Blackback-A2. The usual slow ROPs in the hard sandstones in the LaTrobe Fm were drilled at 4.3 m/hr using a Security ERA22D, which was an improvement on the drilling rates achieved in Blackback-A2 in this section.

Gas levels stayed between 0.5% and 1.0% C1 only until the Latrobe Formation where they rose to a maximum of over 7% C1 with C2 to C5 present, at 3183 m. Background gas was generally lower in this well than in Blackback-A2. Minor CO_2 was detected from 2044 m to 2140 m with a maximum level of 0.13%. No H_2S was detected. After the hydrocarbon zone was passed through, gas levels dropped back down to below 0.1% C1 only.

A core was cut in this well from 3172.0 m to 3199.4 m in the top LaTrobe Sandstone. Recovery was 100% in glauconitic sandstone.

After a short logging program involving two runs, 9 5/8" casing was run with the hole in good condition and the shoe was set at 3261.99 m. While running casing, slow mud losses to the Latrobe sandstone totalling 40 bbl were recorded but the cement job was performed successfully. The casing was then pressure tested before a cement plug was set at 670 m and the well was suspended and released. Instead of performing a completion job on this well, the rig was then moved to the A3 location to drill that well due to non-availability of completion string parts at the time.

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In this well, the practice of backreaming each stand at connections and circulating until the hole was clean before tripping was successful in maintaining good hole conditions. Mud weight was increased before the Lakes Entrance from 10.0 ppg to 10.6 ppg while drilling the Latrobe Fm to control hole stability. Monitoring overpull / drag and torque at connections and studying trends was useful in determining when a wiper trip was necessary. Large gas peaks in the productive zone were not an issue in this well but routine circulations of hole volumes were carried out, which helped keep mud densities constant by keeping the temperature sensitive ester-based mud warm.

WELL PROFILE

Rotary Table to Mean Sea Level
25.9 metres

Rotary Table to Sea Bed
421 metres

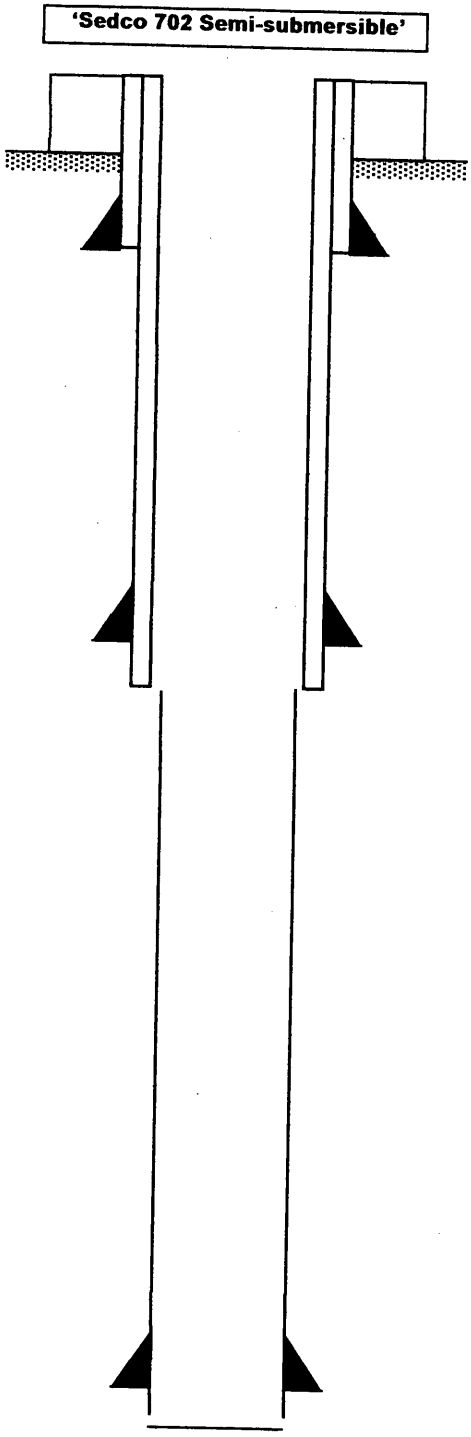
20" Conductor set at 682.57 m
26" hole drilled to 688 mMD

$13^3/_8$" Casing Shoe at 1302.12m

17½" hole drilled to 1310 mMD

9 5/8" Casing Shoe at 3262 mMD

TD 12¼" hole at 3272 mMD



BLACKBACK A-1A well

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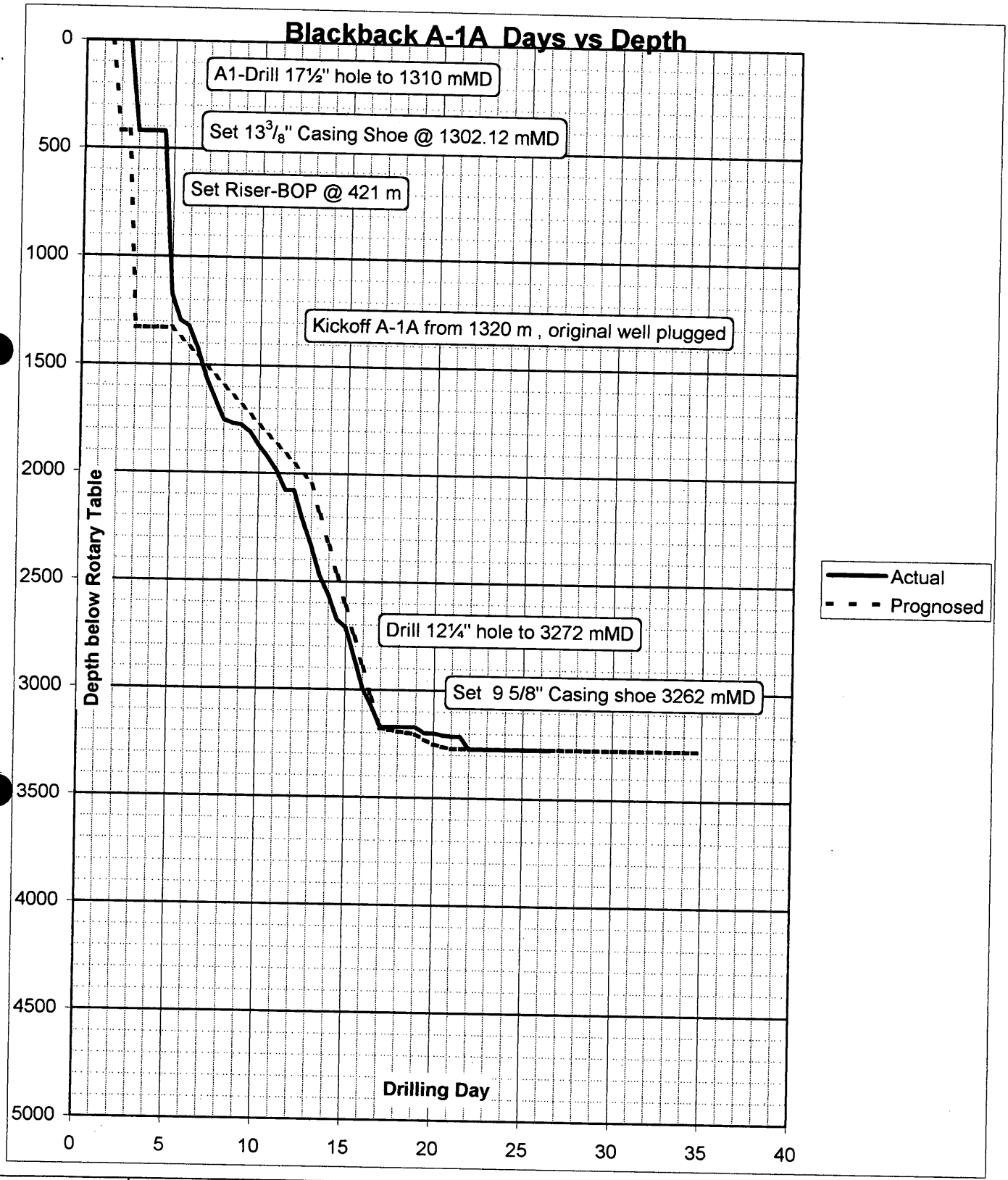

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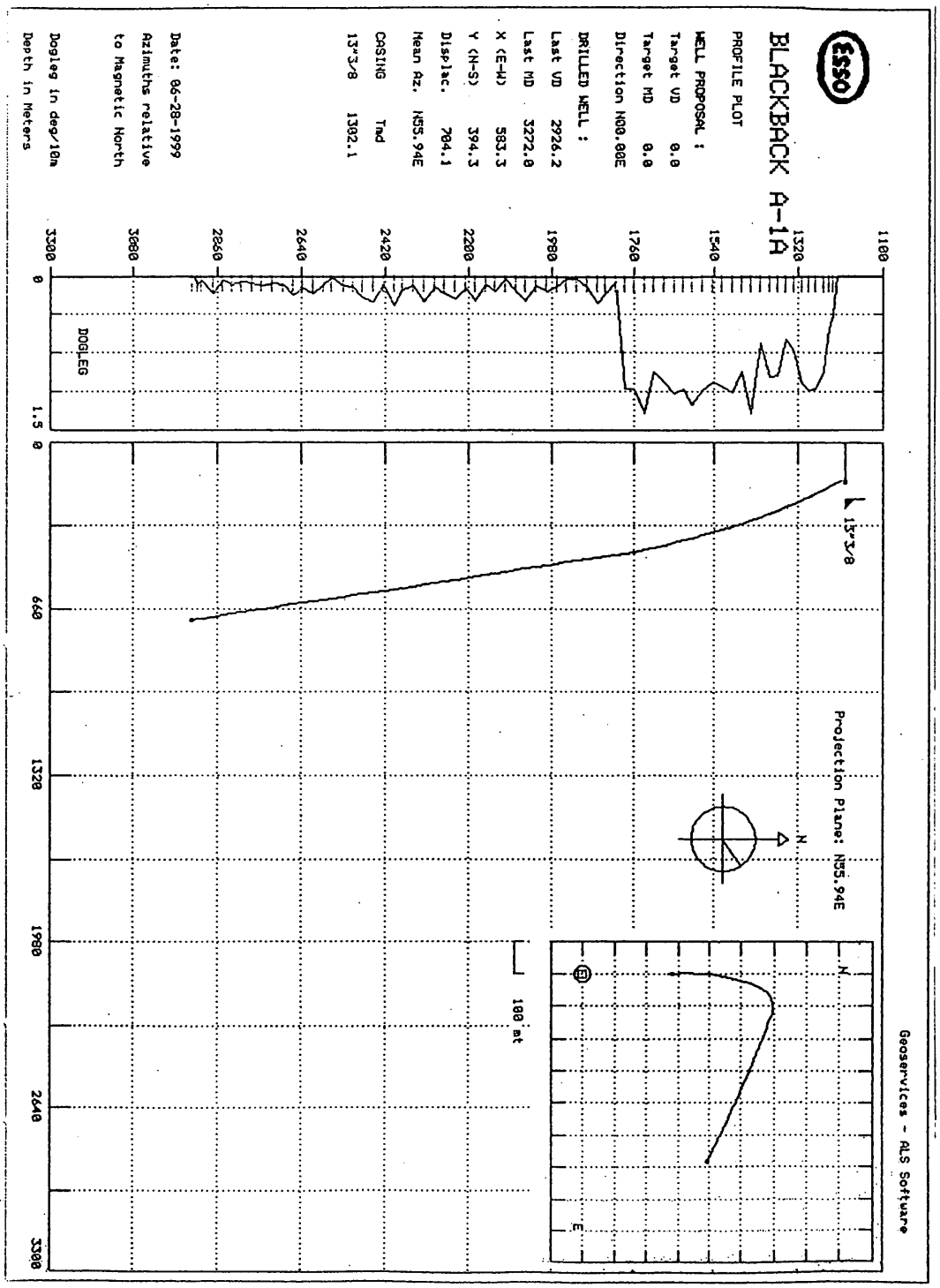

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CEMENTING DATA

Blackback A-1A was cased with 10 3/4" casing from the hanger at 419 m to 1163 m and 9 5/8" casing from 1163 m to the shoe at 3262 m in 3272 m of 12¼" hole. The plug was not bumped after displacing cement with 8402 stks using the rig pumps, with a final circulation pressure of 1850 psi.

SLURRY DETAILS	CEMENT TYPE	DRY CMT VOLUME	CMT ADDITIVES	MIX WATER	SLURRY VOL.	SLURRY DENSITY	CEMENT to/from
Spacer	n/a	n/a	0.1 gal/bbl Dual spacer mixing aid 55 lbs/bbl Dual spacer 155 lbs/bbl Barite 8.8 lbs/bbl KCl 1.0 gal/bbl Musol A 1.0 gal/bbl SEM-7	32.15 gal/bbl fresh water	40 bbl	12.0 ppg	n/a
Lead slurry	Class G	372 sx	0.14 gps SCR-100L retarder 0.75 gps GasCon-469 stabiliser 0.01 gps NF-5 antifoamer	9.0 gps fresh water	130 bbls	13.2 ppg	2173 m to 2883 m
Tail slurry	Class G	366 sx	0.05 gps SCR-100L retarder 0.39 gps Halad-413L fluid loss additive 0.02 GasCon-469 stabiliser 0.01 gps NF-5 antifoamer	4.71 gps fresh water	76 bbls	15.8 ppg	2883 m to 3272 m

WELL DIARY

2 June 1999

Continue to pull Tree cap running tool to surface (skid rig off location). Remove guide lines & break out running tool from stand of 8 1/4" drill collar. Move running tool to starboard deck. Rig up to run BOP (trouble shoot ROV T-4 manipulator arm, pull to surface & jump T-16). JSA & make up double of Riser & rack in derrick (T-16 move guide line #4 from A-2 to A-1). JSA & move BOP to spider beams. ROV move # 1 & 2 guide lines to A-1A. Prepare BOP for running, unable to release # 3 guide line with ROV. Function test BOP on blue & yellow pods from all rig access panels. Pull guide posts & clamps, install guide lines, fit beacons, prepare BOP to run. JSA Vortex induced vibration (VIV) cyst installation on bouyant riser. JSA pick up Riser, run BOP LMRP. Install work platforms in moonpool & anti-fall system for VIV installation. Check rigging, Vessel in area, standby boat to intercept & give warning. Pressure test choke & kill line 200/5000 psi, good test. Continue to run BOP, install VIV system on Riser.

3 June 1999

Continue to run BOP, install VIV system on Riser. Pressure test choke & kill lines 200/5000 psi. Good test. Continue to run BOP-Riser & pressure test lines.

4 June 1999

Continue to run BOP, install VIV system on Riser. Pressure test choke & kill lines 200/5000 psi. Continue to run BOP, vortex induced vibration system on bouyant riser. Pick up slip & landing joint, attach tensioner to slip joint. Move rig to A-1 well head . Attach co-flex choke & kill lines to slip joint & pressure test 200/5000 psi, good test. Unpin slip joint, lay out land joint, pick up & make up diverter, release running tool. Lay out riser spider & rig down 500T handling equipment. Pressure test 13 3/8" casing against shear rams 200/2500 psi, good test. (Rig up A2 shutdown system for Mackeral). Rig up 350T equipment. JSA pick up 5" HWDP & run in hole.

5 June 1999

Continue to pick up 5" HWDP & run in the hole. Make up Vetco test tool with pup above & run in, land out in well head. Attempt to seat test tool, unsuccessful, pick up several times & re-set. Pressure test BOP 200/3500 psi (annulars), rams 200/5000 psi (pressure test 2x TIW/grey valve to 200/5000 psi). Perform depletion test on BOP. Pull out test plug, rig up & pressure test surface equipment 200/5000 psi. Rig down test equipment. (test ESD from rig floor, observe wing valve function with ROV). Make up & run set flex joint wear bushing, pull out & lay out running tool. Anadrill attach motion compensator hose to TDS while service top drive. JSA 12 1/4" BHA pick up & run in hole. JSA pick up 5" drill pipe singles & run in, run in stands in derrick.

6 June 1999

Continue to run in the hole to 1153 m. Precautionary wash & ream to 1172 m. Tag cement 1172 m. Perform diverter drill, hang off drill & function manual choke in well kill situation. Test & function auto chokes. H2S discussion with drill crew. Displace choke & kill lines to petro-free mud. Displace string to petro-free. Drill cement 1172 to 1197 m, hard cement from 1197 to 1320 m. Finish displacing to mud while drilling cement. Circulate & flow check, well static. Pump slug & pull out, flow check at BOP depth. Kick drill. Make up 12 1/4" directional assembly, test DHMotor on surface, set 1.15 degrees angle, re-torque service connections. Run in hole with BHA, run in 5" drill pipe.

7 June 1999

Run in the hole to the shoe. BOP drill. JSA, cut & slip line. Repair Geoservice Rpm sensor after cut & slip. Precautionary wash & ream from 1302 m to 1320 m. Tag bottom, no fill. Work through several times with new BHA outside shoe. Drill 12 1/4" directional hole from 1320 m to 1424 m. Backream each stand 1-2 times as hole dictates, pull one single to record up & down drag before each connection. Perform SCR. Drill to 1502 m, circulate 2xbottom up, boost riser, work string. Drill to 1556 m, backream each stand, survey each connection.

8 June 1999

Continue to drill directional hole 1556 m to 1643 m. Backream each stand twice, pull one single without rotation to confirm up/down weight, take survey before connection. Circulate well clean of cuttings & boost riser until shakers clean. Drill from 1643 m to 1655 m, backream stands, confirm drag & survey. SCR. Drill ahead to 1754 m, backream stands, survey, drag recording..

9 June 1999

Continue to drill directional hole 1754 m to 1762 m, backream stand x 2, take up & down weights. Attempt to re-start MWD-no communication, no success. Drill to 1770 m. Circulate until shakers clean, jet riser. Flow check. Pump out hole to 1700 m. (Drag 25 klb). Slug pipe, wait to equalize, flow check & pull out to shoe. Flow check & pull out BHA. Break out bit, change stabilizer, lay out MWD. Pick up new MWD, test DHM & MWD on surface. . Make up Bit, run in with BHA & drill pipe. Wash to bottom. Steer to 1778 m, DHM (down hole motor) failure, pull out.

10 June 1999

Lay down downhole motor. Pick up serviced downhole motor from catwalk and set angle to 1.15°. Test motor and MWD tool communication OK. Make up bit 2RR3 and RIH to shoe, filling pipe every 20 stands. Repair Anadril sensor and continue RIH. Tag bottom at 1778 m with no fill, hole in good condition, maximum drag 20 klbs. Drill ahead 12¼" hole from 1778 m to 1873 m, backreaming connections and taking surveys.

11 June 1999

Continue drilling 12¼" hole from 1873 m to 1877 m. Change out swab on pump #3. Circulate and work string. Continue drilling from 1877 m to 1990 m, backreaming connections and taking surveys.

12 June 1999

Continue drilling 12¼" hole from 1990 m to 2033 m. Pick up off bottom, circulate and work string while change out cup seal on pump #3. Continue to drill from 2033 m to 2078 m. Circulate bottoms up twice and boost riser. Circulate until shakers clean. Flowcheck - static. POOH from 2078 m to 1937 m, hole in good condition. Flowcheck and continue POOH to shoe. Flowcheck at shoe. Rig down Anadril sensor and service rig. Function test BOPs. Continue POOH and flowcheck before pull out through BOPs. Rack back BHA, lay out MWD tool, stabilisers, downhole motor and bit. Function test shear rams when bit at surface. Hold JSA and make up new 12¼" rotary assembly with VGS. Surface test MWD tool and VGS. RIH with BHA, picking up 12 extra joints of HWDP.

13 June 1999

Continue RIH to shoe at 1302 m. Break circulation and hold kick drill. RIH to 1850 m - drag increasing to 30 klbs. Connect TDS and break circulation. Can not rotate - work string and set off jars. Regain rotation and circulate with maximum pump rate. Wash and ream from 1850 m to 2078 m TD, backreaming each stand. Set VGS to 12¼" and resume drilling 12¼" hole from 2078 m to 2184 m. Pick up off bottom and circulate while change out swab in pump #3. Continue drilling 12¼" hole from 2184 m to 2272 m, backreaming each stand and taking surveys. Circulate and condition mud, boost riser. Raise MW from 10.0 ppg to 10.5 ppg. Perform 5 stand wiper trip from 2272 m to 2129 m, pumping OOH. Hole in good condition. RIH back to bottom. Take torque readings and record SCRs. Circulate and work pipe while change out EMD cooling water pump on #3 RMD. Resume drilling 12¼" hole from 2272 m to 2331 m. Displace choke and kill lines with 10.6 ppg mud.

14 June 1999

Continue drilling 12¼" hole from 2331 m to 2418 m, backreaming each stand 4 times and taking surveys. Circulate and clean hole due to increasing drag. Circulate bottoms up twice until shakers clean. Boost riser. Resume drilling from 2418 m to 2510 m. Circulate and work pipe while change out swab on pump #1 and sheared piston rod on pump #2. Continue drilling from 2510 m to 2563 m

15 June 1999 Continue drilling 12¼" hole from 2563 m to 2676 m, Backreaming each stand 4 times and taking surveys as required. At 2676 m, the hole was circulated clean and the riser jetted. The drillstring was pumped out of the hole from 2676 m, to 2534 m. From 2534 m to 1825 m, the drillstring was backreamed. The drillstring was pulled From 1825 m to 1302 m, working the hole as required. At the shoe the hole was circulated until clean. The drillstring was run in the hole from 1302 m to 2631 m. The drillstring was wased and reamed from 2631 m to 2676 m, with no fill at the bottom of the hole.

16 June 1999 Drilling of 12¼" hole from 2716 m to 2995 m continued, backreaming each stand 4 times noting torque and drag, and taking surveys as required. At 2995 m, the hole was circulated clean and the riser boosted as required.

17 June 1999 Circulation of the hole continued until the shakers cleaned up. The drillstring was then pumped fout from 2995 m to 2700 m, the hole circulated until clean. The drillstring was run back in the hole from 2700 m to 2958 m with no tight spots. The drillstring was washed and reamed from 2958 m to 2995 m, with no fill being encountered. Drilling of 12¼" hole continued from 2995 m to 3172 m, where the sample was circulated to surface, this being picked as core point. Circulation contined.

18 June 1999 Continue circulating hole clean. Pump out of hole from 3172 m to 2700 m with no rotation. Circulate bottoms up and boost riser. POOH from 2700 m to 2622 m and flowcheck. Pump slug and continue POOH to 2042 m. Backream out of hole from 2042 m to the shoe at 1302 m, working string at tight spot at 2013 m. Flowcheck at shoe, circulate until shakers are clean. Flowcheck again and slip and cut drilling line. Pump slug and POOH to surface. Flowcheck before BHA at BOPs. Break out bit. RIH and recover flex joint wear bushing. Make up and RIH BOP test tool. Pressure test BOPs on yellow pod. Function test BOPs on blue pod. Test manifold.

19 June 1999 POOH and lay down test plug. Rig up and pressure test surface equipment to 5000 psi. Make up RT and RIH and set flex joint wear bushing - misrun. Run again and set OK. Clean drill floor of excess mud. Hold JSA and pick up and make up core barrel assembly. Move MWD stand in derrick and drift 8¼" collars. Make up outer core barrels and inner tubes. Make up core head and adjust core catcher. Continue to pick up and drift BHA. Pick up new jars. RIH, breaking circulation every 20 stands and drifting DP. Break circulation at the shoe and continue RIH to 3075 m. Wash down from 3075 m to 3172 m, take weight and torq readings and tag bottom. Circulate bottoms up and boost riser. Lay out single and pick up pup joint to space out core interval. Drop ball and take SCRs.

June 1999 Cut core from 3172 m to 3199.4 m. Pump out of hole from 3199 m to 3170 m. Flowcheck and lay out pup joint, pick up single. Pump slug and POOH from 3170 m to 2806 m. Pump second slug at 2806 m and continue POOH from 2806 m to the shoe. Hole in good condition. Flowcheck at shoe and continue POOH from 1302 m to surface. Flowcheck when BHA at BOPs. Rack back 5" HWDP. Trip out of hole performed according to Esso depth vs time requirements. Check for H2S while POOH BHA. Break out core head and run back in with core barrel. Hold JSA on core recovery and lay out inner and outer core barrels. Clear floor of excess equipment and tidy up. Make up 12¼" bit and RIH with drilling assembly.

21 June 1999 Continue to ream out core hole from 3179 m to 3199 m. Work the drillstring and drill ahead to 3213 m..Pull out of hole for a bit change due to slow rate of penetration. Backream from 3213 m to 3143 m, pull out of hole to shoe at 1302 m, flow check, pull to surface.

22 June 1999 Make up bit #5 ,test MWD and run in the hole to 3213 m. Ream to bottom and drill ahead from 3213 m to 3272 m, TD.Circulate until the shakers cleaned up, .

23 June 1999 Backream from 3272 m to 3150 m, ream back down to 3272 m. Circulate until shakers clean, wash out of hole to 3150 m. Pull out of hole to 1302 m, flow check. Continue to pull out of hole to surface. Lay out MWD tools and rig up for wireline logging.

24 June 1999 Rig up 5½" 500T hand equipment, make up casing running tool to 5½" HWDP, pick up and make cement head assembly and rack it back. Rig down 500T equipment, and lay out 12¼" BHA from derrick. Make up 12¼" clean up assembly and run in hole to shoe (1302 m) filling every 20 stands. Break circulation at shoe. RIH from 1302 m to 3160 m filling pipe and breaking circulation every 20 stands for 10 min. Precautionary wash from 3160 m to 3273 m. Circulate and conditioning mud. Trip gas at 3272 m was 33.7 units. Wash out of hole to 3136 m and do a flow check - OK. After pumping a slug POOH from 3136 m to 1302 m and perform flow check - OK. POOH laying out bit and stabilizers. Picking up 8¼" DC to rack stands in derrick. Make up and RIH with wear bushings and retrieve flexible wear bushings. Make up Vetco wash tool and Vetco wear bushings

25 June 1999 RIH with Vetco well head wear bushings and running tool on 5½" HWDP , flush BOP's and recover wear bushings, take in index mark, flush well head and POOH. Lay out running tool and wash assembly. Rig up to run 9 5/8" casing, install FMS. Pick up and make shoe joint, intermediate joint and float joint, test same. Pick up TAM packer and install on TDS, function same. RIH with 9 5/8" casing filling every 5 joints, at shoe break circulation and change out to 350T elevators, continue to RIH as per tally. Change 350T elevators to 10 3/4", 500T elevators. Change FMS to 10 3/4" and continue to RIH with 10 3/4" casing from 2099 m to 2624 m filling every 5 joint.

26 June 1999 Continue RIH with 10 3/4" casing from 2624 m to 2843 m, filling every 5 joints. Rig down elevators and TAM packer. Make up hanger and rig down FMS. RIH with casing on 5" HWDP landing string. Make up cement stand and land out hanger, shoe at 3161.99 m. Break circulation and hold JHA prior to cement job. Rig up cement lines and pump 20 bbls of ester spacer. Chase with 165 bbls KCl Polymer mud with rig pumps. Using Dowell unit, pump 40 bbls of surfactant spacer. Pressure test lines to 4000 psi. Drop ball and pump further 40 bbls of surfactant spacer. Shear bottom plug at 1200 psi. Mix and pump cement as per program. Release dart and pump 20 bbls drill water with Dowell unit. Shear wiper plug at 2600 psi. Displace cement with rig pumps using inhibited seawater with total of 8402 strokes. Failed to bump the plug, final circulation pressure 1850 psi. Check for back flow and rig down cement line. Set the seal assembly as per Vetco and test same -250 psi low/ 5000 psi high. Displace riser to sea water (1 ½ times). Release P.A.D.P.R.T. and POOH laying out running tool on way out. Run cement head stand and lay out same. Rack stand in derrick. Make up and run impression block, land out and set, POOH and lay out tool. RIH and set 9 5/8" Vetco well head wear bushings. POOH and lay out tool. Change out saversub on TDS. Rig up and run 3½" cement stringer. Pick up mule shoe and 3½" DP.

27 June 1999 Continue to RIH with 3½" DP stinger on 5" DP to 150 m. Service TDS. Pressure test casing against shear rams 250 psi low, 5000 psi high. Continue to RIH with 3½" DP stinger to 670 m and spot 50 bbls high vis pill. POOH to 505 m and rig up side entry and cement hose. Hold JSA. Pressure test lines, mix and pump cement. Rig down hose and POOH to 440 m. Reverse circulate two times string volume and POOH to 418 m. Circulate riser volume while flushing BOP's, choke and kill line. POOH from 418 m laying out 3½" DP stinger, rig down 3½" handling equipment. Make up 5" mule shoe and RIH on 5" DP to tag plug at 460 m. Lay out 5" mule shoe and rig up to pull diverter. Rig up 500T equipment. Engage diverter running tool and pull diverter. Remove guide lines from A-1A CGB with ROV and move rig off location from A-1A to A3.

Section 2

Geological Summary

Revision	Date	Issued by	Approved by	Remarks
1	01/02/99	Geoservices Unit 093	Base Mudlogging Coordinator	

FORMATION TOPS (WELLSITE PICKS)

DESCRIPTION	MD (m) - RT	TVD (m) (26m RT)
GIPPSLAND LIMESTONE	426	426
LAKES ENTRANCE FORMATION	2836	2535
LaTROBE FORMATION	3170	2835
COARSE CLASTICS	n/a	n/a
TOTAL DEPTH	3272	2926

GEOLOGICAL SUMMARY

1172-1330 m TMD **CEMENT**

1330-1770 m TMD **LIMESTONE (Calcisiltite)**

LIMESTONE Light grey, light olive-grey, calcisiltite, occasional calcarenite laminae, common carbonaceous specks, trace fossil fragments, trace Glauconite in parts, firm, subblocky to blocky.

1770-1970 m TMD **LIMESTONE (Calcisiltite)**

LIMESTONE Medium grey, brown-grey, calcisiltite, occasionally grading to calcarenite and micrite in parts, trace carbonaceous specks, firm, massive, blocky.

1970-2510 m TMD **LIMESTONE (mainly Calcisiltite)**

LIMESTONE Light grey, light olive-grey, medium to dark grey, calcisiltite, occasionally grading to calcarenite or calcilutite in parts, trace carbonaceous specks, rare Glauconite in parts, slightly dolomitic in parts, firm to moderately hard, massive, blocky.

2510-2846 m TMD **LIMESTONE (mainly Calcilutite)**

LIMESTONE Medium to dark grey, olive-grey, brown-grey, calcilutite, occasionally light grey calcarenite laminae, silty in parts, micritic, trace carbonaceous specks, rare Glauconite and Pyrite in parts, trace fossil fragments in lower parts, becoming waxy in texture, firm to moderately hard, massive, blocky.

2846 m TMD (2582 m TVD) **LAKES ENTRANCE FORMATION**

2846-3170 m TMD **CLAYSTONE**

CLAYSTONE Dark grey, olive-grey, becoming light to medium grey, brown-grey, light bluish grey, grading from calcilutite at top of interval, becoming less calcareous with depth, rare calcilutite laminae, trace carbonaceous specks, rare disseminated Pyrite and nodular Pyrite in parts, rare local Glauconite at top of interval, very soft and dispersive to firm, blocky to occasionally amorphous.

3170 m TMD (2835 m TVD) **LATROBE GROUP**

3170-3205 m TMD **SANDSTONE**

SANDSTONE Light to medium grey, green-grey, fine to medium grained, locally coarse to very coarse, common siliceous cement, local calcareous/dolomitic cement, abundant Glauconite in parts, trace Muscovite and Biotite, occasional rock fragments, predominantly moderately hard, locally friable, poor to occasionally fair to good porosity, nil to good fluorescence.

3205-3272 m TMD **SANDSTONE with minor SILTSTONE**

SANDSTONE Clear to translucent, frosted, milky, medium to predominantly coarse grained, subround to angular, moderately, becoming poorly sorted with depth, trace Kaolinite matrix and inclusions, common very coarse milky Quartz fragments, trace disseminated Pyrite, trace Glauconite, disaggregated, fair becoming poor porosity with depth, poor to nil fluorescence.

SILTSTONE Medium to dark grey, green-grey, very argillaceous, becoming more arenaceous with depth, grading to very fine sandstone, common Glauconite, micromicaceous, trace disseminated Pyrite, common fine Quartz grains, soft, becoming firm to moderately hard with depth, amorphous, subblocky to blocky in parts.

FLUORESCENCE REPORT

DEPTH 3179 m to 3181 m and 3199 m to 3199.4 m TMD

SANDSTONE Light to medium grey, green-grey, fine to medium grained, locally coarse to very coarse, common siliceous cement, local calcareous/dolomitic cement, abundant Glauconite in parts, trace Muscovite and Biotite, occasional rock fragments, predominantly moderately hard, locally friable, good porosity.

FLUORESCENCE 60% to 100%, bright, patchy to solid, pale yellow fluorescence, instant cut, moderate residual ring.

ASSOCIATED GAS Note: gas circulated after trip.

Depth	Tot Gas	C1	C2	C3	iC4	nC4	iC5	nC5
3179.0	332.5	5.33	0.25	0.06	0.01	0.01	0.01	0.01
3181.0	349.9	5.33	0.25	0.06	0.01	0.01	0.01	0.01
3199.0	150.9	3.36	0.18	0.05	0.01	0.01	0.01	0.01

DEPTH 3181 m to 3196 m TMD

SANDSTONE Light to medium grey, green-grey, fine to medium grained, locally coarse to very coarse, common siliceous cement, local calcareous/dolomitic cement, abundant Glauconite in parts, trace Muscovite and Biotite, occasional rock fragments, predominantly moderately hard, locally friable, poor to fair porosity.

FLUORESCENCE 5% to 20%, dull to moderately bright, pale yellow, patchy fluorescence, weak cut, thin to nil residual ring.

ASSOCIATED GAS Note: gas circulated after trip.

Depth	Tot Gas	C1	C2	C3	iC4	nC4	iC5	nC5
3181.5	376.4	6.10	0.27	0.07	0.01	0.01	0.01	0.01
3183.0	378.9	6.12	0.29	0.07	0.01	0.01	0.01	0.01
3186.0	359.8	5.97	0.30	0.08	0.01	0.01	0.01	0.01
3196.0	169.6	3.36	0.18	0.05	0.01	0.01	0.01	0.01

DEPTH 3220 m to 3240 m TMD

SANDSTONE Clear to translucent, frosted, medium to predominantly coarse grained, subangular to angular, poor to moderate sorting, trace Kaolinite matrix, common very coarse milky Quartz fragments, trace disseminated Pyrite, trace Glauconite, disaggregated, fair porosity.

FLUORESCENCE Trace to 5%, dull to moderately bright, pale yellow, patchy fluorescence, feint instant cut, thin residual ring.

ASSOCIATED GAS Note: gas circulated after trip.

Depth	Tot Gas	C1	C2	C3	iC4	nC4	iC5	nC5
3220.0	9.9	0.19	0.01	tr				
3226.5	23.1	0.35	0.03	0.01	tr	0.01	tr	tr
3240.0	3.8	0.08	tr					

GAS REPORT

Gas levels while drilling Blackback A-1A remained mostly below 50 units (<1% C1) of methane only until encountering the Latrobe Formation top at 3170 m. Here gas peaked at 378.9 units at 3183 m with all components from C1 to C5 featured (see tables in Fluorescence section). After drilling through the hydrocarbon zone, gas levels quickly dropped down to less than 5 units of C1 only. The only interval where background gas contained any heavy component (C2 to C5) was in the top of the LaTrobe Fm. In general, the background gas in Blackback A-1A was lower and drier than that recorded in Blackback-A2.

Background gas in the LaTrobe was very dry in composition. As drilling progressed through the productive zone, gas composition became wetter and heavier hydrocarbons were detected in increasing relative quantities, however butane and pentane were not present in significant amounts. This is possibly as a consequence of remaining in solution in the ester-based drilling fluid, as could be seen by the ease in which gas peaks eg. trip gas could be recirculated through the system three or four times.

The Gas Ratio plot shows a small zone of rich oil-indicating gas from 3204 m to 3209 m MD. In this section, the wetness is between 10 and 20, indicating gas or light oil. The balance and character confirm a light oil or gas condensate zone due to the presence of significant quantities of C4 and C5. These indications may be less than accurate because they are based on gas readings circulated after tripping with the core barrel and heavier alkanes would have had time to enter into solution in the ester-based drilling fluid, making it harder for degassing equipment to extract them later.

A summary of trip gas peaks appears below. For gas peaks while drilling the LaTrobe Formation, see the Fluorescence section on the previous page.

TRIP GAS PEAKS

Depth (m MD)	Type	MW (ppg)	Tot. Gas (units)
1770	bit trip	10.1	7.0
1778	bit trip	10.0	6.0
2078	bit trip	10.0	12.0
2272	wiper trip	10.1	none
2676	wiper trip	10.6	24.5
2995	wiper trip	10.6	5.3
3172	bit trip	10.6	80.3
3199	bit trip	10.6	374.7
3213	bit trip	10.6	21.9
3272	wiper trip after logging	10.8	33.7

OVERPRESSURE SUMMARY

The following techniques were utilized as indicators of abnormal formation pressures during the drilling of Blackback A-1A:

D-EXPONENT: This is a normalised rate of penetration which takes into account variables such as weight on bit, rotation, and mud weight. It is designed to quantitatively predict pore pressures in shaley formations. It may also be used as an indicator in siltstones, silty shales and calcareous claystones since the fundamental principle that underbalanced bottom hole conditions result in faster drilling applies to all these formations. A shift in the normal trend (representing a normal compaction trend) to the left (representing relative undercompaction) may indicate overpressure or increased porosity due to lithological changes.

GAS: Overpressure may be indicated by increases in the background gas, trip gas, and connection gas readings. Similar changes may however also occur as a result of formation porosity changes which are unrelated to pore pressures.

CUTTINGS: Small splintery cuttings indicate overpressured formations. Long propeller-shaped cavings are usually caused by overpressure or by the hydration of reactive or swelling clays.

HOLE CONDITIONS: As mentioned above, cavings resulting from overpressure may be introduced into the hole. Subsequently, increased overpull and drag on the drill collars and stabilizers during connections and trips may occur. Increasing torque trends show deteriorating hole condition for similar reasons. Encountering hole fill on running back to bottom may also be indicative of overpressure.

TEMPERATURE: Changes in downhole temperature can be measured at the surface by means of a temperature sensor positioned in the flow line. The primary factor that enables this measurement to be of use in overpressure studies, is thermal conductivity. In an undercompacted sequence, the presence of an abnormally high percentage of pore fluids causes heat to be trapped. Hence the area immediately above the overpressured unit is a zone of heat starvation. Changes in thermal gradient can therefore be used to map a transition from normally pressured to overpressured environments. Limitations of this technique include riser cooling by seawater, surface mud additions, circulation breaks, changes in ROP, hole size and flow rate, all of which may mask or distort surface mud temperature readings.

The use of all these methods in conjunction with each other will give the most reliable indication of any abnormal formation pressures. In non-shaley formations such as the limestones which make up the greater part of Blacback A-1A, the D Exponent cannot be quantitative and since it is also affected by directional drilling practices, it must be ignored.

Background gas readings showed little character during this well while drilling through the long Lakes Entrance limestone sequence. The gas peaks in the LaTrobe Formation were due to lithological factors and not increased formation pressures. The table of trip gas peaks on the preceding page shows no excessive gas influx due to swabbing except for the trips made when the gas cap zone had been freshly drilled and gas bleeding into the hole would be expected.

No splintery or unusually shaped cuttings were observed in the cuttings samples during this well.

Hole conditions were closely monitored during this well. Drag, overpull and torque values were noted every connection while drilling the 12¼" phase. Increasing trends were generally cured with a wiper trip, showing that hole behaviour was related to deviation, cleaning or other factors, not formation pressures.

Mud temperature plots show no evidence of an abnormal temperature gradient.

From these observations, there is no evidence of overpressured formations in Blackback A-1A. Abnormal pressures in this part of the Bass strait are known to come in below the massive P.Mawsonii marine shale at 4000 m +/- SS, much deeper than the top of the Latrobe Group development target proposed for the Blackback A-1, A-2 and A-3 wells.

Revision	Date	Issued by	Approved by	Remarks
1	01/02/99	Geoservices Unit 093	Base Mudlogging Coordinator	

PE613744

This is an enclosure indicator page.
The enclosure PE613744 is enclosed within the container PE908078 at this location in this document.

The enclosure PE613744 has the following characteristics:

ITEM_BARCODE	PE613744
CONTAINER_BARCODE	PE908078
NAME	Master Log, Blackback-A1A, 1:500
BASIN	GIPPSLAND
ONSHORE?	N
DATA_TYPE	WELL
DATA_SUB_TYPE	MUD_LOG
DESCRIPTION	Master Log, Blackback-A1A, 1:500, (encl. in Final Well Report, Blackback-A1A, W1295), by Geoservices Logging for Esso, June 1999.
REMARKS	
DATE_WRITTEN	22-JUN-1999
DATE_PROCESSED	
DATE_RECEIVED	
RECEIVED_FROM	Esso
WELL_NAME	Blackback-A1A
CONTRACTOR	Geoservices
AUTHOR	
ORIGINATOR	Esso
TOP_DEPTH	1270
BOTTOM_DEPTH	3270
ROW_CREATED_BY	JM00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE613745

This is an enclosure indicator page.
The enclosure PE613745 is enclosed within the container PE908078 at this location in this document.

The enclosure PE613745 has the following characteristics:

ITEM_BARCODE	PE613745
CONTAINER_BARCODE	PE908078
NAME	Master Log, Blackback-A1A, 1:200
BASIN	GIPPSLAND
ONSHORE?	N
DATA_TYPE	WELL
DATA_SUB_TYPE	MUD_LOG
DESCRIPTION	Master Log, Blackback-A1A, 1:200, (encl. in Final Well Report, Blackback-A1A, W1295), by Geoservices Logging for Esso, June 1999.
REMARKS	
DATE_WRITTEN	22-JUN-1999
DATE_PROCESSED	
DATE_RECEIVED	
RECEIVED_FROM	Esso
WELL_NAME	Blackback-A1A
CONTRACTOR	Geoservices
AUTHOR	
ORIGINATOR	Esso
TOP_DEPTH	3120
BOTTOM_DEPTH	3272
ROW_CREATED_BY	JM00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE613746

This is an enclosure indicator page.
The enclosure PE613746 is enclosed within the container PE908078 at this location in this document.

The enclosure PE613746 has the following characteristics:

ITEM_BARCODE	PE613746
CONTAINER_BARCODE	PE908078
NAME	Mud Log, Blackback-A1A, 1:200
BASIN	GIPPSLAND
ONSHORE?	N
DATA_TYPE	WELL
DATA_SUB_TYPE	MUD_LOG
DESCRIPTION	Mud Log, Blackback-A1A, 1:200, (encl. in Final Well Report, Blackback-A1A, W1295). Log is undated. Contains Gas Ratio Log data (character; wetness and balance).
REMARKS	
DATE_WRITTEN	
DATE_PROCESSED	
DATE_RECEIVED	
RECEIVED_FROM	Esso
WELL_NAME	Blackback-A1A
CONTRACTOR	
AUTHOR	
ORIGINATOR	Esso
TOP_DEPTH	3120
BOTTOM_DEPTH	3272
ROW_CREATED_BY	JM00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE613747

This is an enclosure indicator page.
The enclosure PE613747 is enclosed within the container PE908078 at this location in this document.

The enclosure PE613747 has the following characteristics:

ITEM_BARCODE	PE613747
CONTAINER_BARCODE	PE908078
NAME	Pore Pressure Log, Blackback-A1A, 1:1000
BASIN	GIPPSLAND
ONSHORE?	N
DATA_TYPE	WELL
DATA_SUB_TYPE	WELL_LOG
DESCRIPTION	Pore Pressure Evaluation Log, Blackback-A1A, 1:1000, (encl. in Final Well Report, Blackback-A1A, W1295), Esso, June 1999.
REMARKS	
DATE_WRITTEN	22-JUN-1999
DATE_PROCESSED	
DATE_RECEIVED	
RECEIVED_FROM	Esso
WELL_NAME	Blackback-A1A
CONTRACTOR	
AUTHOR	
ORIGINATOR	Esso
TOP_DEPTH	1260
BOTTOM_DEPTH	3280
ROW_CREATED_BY	JM00_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE613748

This is an enclosure indicator page.
The enclosure PE613748 is enclosed within the container PE908078 at this location in this document.

The enclosure PE613748 has the following characteristics:

ITEM_BARCODE	PE613748
CONTAINER_BARCODE	PE908078
NAME	Drilling Log, Blackback-A1A, 1:1000
BASIN	GIPPSLAND
ONSHORE?	N
DATA_TYPE	WELL
DATA_SUB_TYPE	WELL_LOG
DESCRIPTION	Drilling Log, Blackback-A1A, 1:1000, (encl. in Final Well Report, Blackback-A1A, W1295), by Geoservices Logging for Esso, June 1999.
REMARKS	
DATE_WRITTEN	22-JUN-1999
DATE_PROCESSED	
DATE_RECEIVED	
RECEIVED_FROM	Esso
WELL_NAME	Blackback-A1A
CONTRACTOR	Geoservices
AUTHOR	
ORIGINATOR	Esso
TOP_DEPTH	1260
BOTTOM_DEPTH	3272
ROW_CREATED_BY	JM00_SW

(Inserted by DNRE - Vic Govt Mines Dept)