

WCR (VOL.1)  
BILLFISH-1  
(W1178)

**Esso Australia Ltd.**

**WELL COMPLETION REPORT**

**PETROLEUM DIVISION**

**BILLFISH 1**

**06 AUG 1997**

**VOLUME 1**

**BASIC DATA**

**GIPPSLAND BASIN  
VICTORIA**

**ESSO AUSTRALIA LIMITED**

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June, 1997

# WELL COMPLETION REPORT

## BILLFISH 1

### VOLUME 1: BASIC DATA

#### CONTENTS

1. WELL DATA RECORD
2. OPERATIONS SUMMARY
3. CASING DATA
4. CEMENTING DATA
5. SAMPLES, CONVENTIONAL CORES, SIDEWALL CORES
6. WIRELINE LOGS AND SURVEYS
7. TEMPERATURE RECORD

#### FIGURES

1. LOCALITY MAP
2. WELL PROGRESS CURVE
3. PLUG & ABANDONMENT SCHEMATIC
4. HORNER TEMPERATURE PLOT - SUITE 1

#### APPENDICES

1. LITHOLOGICAL (CUTTINGS) DESCRIPTIONS
2. SIDEWALL CORE DESCRIPTIONS
3. CHECKSHOT SURVEY
4. DEVIATION SUMMARY
5. MUD LOG

## 1. WELL DATA RECORD

LOCATION : Latitude : 38° 40' 13.00" South  
Longitude : 148° 33' 14.62" East  
X= 635195.5mE  
Y= 5718651.4mN  
Map Projection: UTM.  
AGD 66 AMG55-CM47  
Geographical Location: Gippsland Offshore,  
Victoria  
Field : Wildcat

PERMIT : Vic/P34

ELEVATION : 31m

WATER DEPTH : 499m

TOTAL DEPTH : 3250m (Driller) 3248m (Logger)

PLUG BACK TYPE : Cement Plug

REASONS FOR PLUGGING BACK : Plug and Abandon

MOVE IN : 18/01/97 at 0930 hours

SPUDED : 21/01/97 at 0930 hours

REACHED TD : 05/02/97 at 2230 hours

RIG RELEASED : 12 /02/97

OPERATOR : Esso Australia Resources Ltd.

PERMITTEE OR LICENCEE : BHP Petroleum (Bass Strait) Pty Ltd and Esso Australia Resources Ltd.

ESSO INTEREST : 50% (in Permit)

OTHER INTEREST : BHPP 100% (sole risk well)

CONTRACTOR : Sedco Forex

RIG NAME : Sedco 703

EQUIPMENT TYPE : Semisubmersible

TOTAL RIG DAYS : 26 days

DRILLING AFE NO : L70016000

TYPE COMPLETION : Plugged and Abandoned

WELL CLASSIFICATION : Wildcat

## 2. OPERATIONS SUMMARY

### 1. MOVING/MOORING

The Sedco 703 was under tow by the MV Lady Elaine and assisted by the MV Lady Audrey from Great White 1 at 2300 hours on the 17th January, 1997. The Sedco 703 arrived at the Billfish 1 location with the #7 anchor on bottom at 0930 hours on the 18th January, 1997. All anchors were run and tensioned by 0900 hours on the 20th January, 1997. The final rig location was 7.12m on a bearing of 016.6°T from the called location. The water depth was 499m.

### 2. DRILLING OPERATIONS

#### 36" Hole/30" Casing

A Hughes 14<sup>3</sup>/<sub>4</sub>" GTX-1 bit with 26" and 36" hole openers was made up and run with the TGB to the mudline and spudded Billfish 1 at 0930 hours on the 21st January, 1997. The 36" hole section was drilled from 530m to 563m. A wiper trip was made to the mudline and the well was displaced with Hi Vis mud in stages on the trip out prior to running the casing.

The 30" casing and 30" wellhead joint were run with the float shoe landed at 563m. The casing was cemented with 600 sacks of class 'G' cement with 2% CaCl<sub>2</sub> (slurry weight 15.8ppg).

#### 17<sup>1</sup>/<sub>2</sub>" Hole/13<sup>3</sup>/<sub>8</sub>" Casing

A 17<sup>1</sup>/<sub>2</sub>" Reed MS11GLKCC bit was made up with a rotary assembly and used to drill out the float shoe and new formation from 564m to 873m. At 873m a survey was dropped, when attempting to recover the survey tool the overshot became stuck in the HWDP. A trip was made to recover the overshot and survey tool. The survey was a misrun. The same bit and BHA were re-run and continued to drill from 873m to 1053m. A single shot survey was taken (1/2°/220° @ 1048m). Drilling proceeded to 1317m. A wiper trip was made to the 30" casing shoe and the hole was circulated clean and displaced in stages with Hi Vis mud on the trip out (1/2°/220° @ 1312m).

A total of 68 joints of K-55 grade 68lb/ft 13<sup>3</sup>/<sub>8</sub>" casing was run and cemented with a lead of 1387 sacks of class 'G' cement with 0.45 gallons /sack of econolite and 2 gallons HR6-L per 10 barrels of mix water and a tail of 651 sacks of class 'G' cement with 3 gallons HR6-L per 10 barrels of mix water. The shoe was set at 1301.74m. Strong bottom sea currents were encountered when running the 13<sup>3</sup>/<sub>8</sub>" causing problems whilst attempting to stab into the well head.

The BOP stack was run pressure and function tested.

#### 12<sup>1</sup>/<sub>4</sub>" Hole

A 12<sup>1</sup>/<sub>4</sub>" Geodiamond M91P PDC bit with 2000XL tandem mud motor was made up with a new BHA with MWD and RIH. The float and shoe track was drilled out and the rat hole cleaned out to 1317m whilst displacing the seawater with NaCl/PHPA mud. Then 3m of new formation was drilled to 1320m. The hole was circulated clean and a Phase II PIT was performed (EMW = 12.4ppg). Four further PIT's were performed giving 10.8 to 11.1ppg EMW's. Drilling continued from 1320m to 1944m. The hole was circulated clean and a single shot survey was dropped (MWD pulsar failed at 1799m) prior to making a wiper trip to

## 2. OPERATIONS SUMMARY (CONT'D)

the casing shoe. The single shot survey was retrieved (1°/285° @ 1915m) and the drillstring tripped back to bottom. Drilling proceeded from 1944m to 2232m. The hole was circulated clean and a single shot survey was dropped at 2203m. The survey tool was stuck and the slick line parted when attempting to pull the single shot. A trip was made to retrieve the survey tool.

The same 12¼" Geodiamond M91P PDC bit with 2000XL tandem mud motor was rerun and a new MWD pulsar and probe was installed. Drilling proceeded at 50-60m/hr to 2400m whereupon a lost circulation zone was intersected. The rate of loss was initially 200bbl/hr. After spotting several LCM pills (Barocarb and Kwikseal pills) the hole stabilised and drilling continued from 2400m to 2972m. Whilst drilling the interval below the loss zone the hole continued to take mud whilst drilling at a rate of 40-60bbl/hr. A bit trip was made due to very low penetration rate.

A new 12¼" Hughes ATM-22 was made up with a packed rotary assembly and RIH. The hole was tight from 2074m and reaming was required at intermittent levels. There was hard reaming from 2424m to 2577m. The pipe was stuck at 2577m. After working the pipe free the pipe was tripped out and two stabilisers were laid out. The same bit was re-run with a pendulum BHA and ran to bottom without any reaming. Drilling proceeded from 2972m to 3250m. A wiper trip was made prior to running Suite 1 of the E-log programme: DLL-AS-LDL-CNL-MSFL-GS-AMS, CSAT and CST-GR.

Following the electric logging programme open ended drill pipe was tripped into the hole and the well was plugged, prior to abandonment, with 4 cement plugs at: 2970-2820m, 2385-2235m, 1350-1200m and 650-550m. A bridge plug was set using wireline at 650m prior to pumping the final cement plug.

Billfish 1 was plugged and abandoned and the Sedco703 released from location on 12th February, 1997.

### 3. CASING DATA

CASING OD (IN)	WEIGHT (LBS/FT)	GRADE	CONN	NUMBER OF JOINTS	LENGTH (M)	SHOE DEPTH (M)	CENTRALIZERS
30	456 (1.5" WT)	X-52	Vetco ALT2	WH Joint	12.26	540	None
	310 (1.0" WT)	X-52	Vetco ST2	2	23.52	563	None
20 x 13-3/8	133 (0.625" WT)	X-56	DQ FB-60	XO Swage	5.27	540	1 Rigid
	68	K-55	Bull	65	761.81	1302	5

#### 4. CEMENTING DATA

DEPTH (M)	JOB DESCRIPTION	SACKS CLASS 'G'	ADDITIVES		MIX WATER TYPE	SLURRY DENSITY
			QTY	PRODUCT		
563	30" Casing	600	2% BWOC	CaCl <sub>2</sub>	SW	15.8
1302	13-3/8" Casing - Lead	1387	0.45 gps	Econolite, extender	SW	12.5
	- Tail	651	0.06 gps 0.04 gps	HR-6L, retarder HR-6L, retarder	FW	15.8
2,970 - 2,815 (tagged)	Plug #1	430	0.07 gps	HR-6L, retarder	FW	15.8
2,385 - 2,235	Plug #2	400	0.05 gps	HR-6L, retarder	FW	15.8
1,350 - 1,206 (tagged & tested)	Plug #3	414	Neat		SW	15.9
650 - 550	Plug #4	240	1% BWOC	CaCl <sub>2</sub>	SW	15.8



## 5. SAMPLES

<u>Interval (m)</u>	<u>Type</u>
1317-1900	4 Sets of washed and oven dried cuttings samples and 1 set of lightly washed and dried cuttings samples at 30m intervals.
1900-2400	4 Sets of washed and oven dried cuttings samples and 1 set of lightly washed and dried cuttings samples at 10m intervals.
2400-2500	4 Sets of washed and oven dried cuttings samples and 1 set of lightly washed and dried cuttings samples at 5m intervals.
2500-2890	4 Sets of washed and oven dried cuttings samples and 1 set of lightly washed and dried cuttings samples at 10m intervals.
2890-3250(TD)	4 Sets of washed and oven dried cuttings samples and 1 set of lightly washed and dried cuttings samples at 5m intervals.

## 6. WIRELINE LOGS AND SURVEYS

Type	Scale	From	To
<i>Suite 1</i>			
<i>Run 1</i>			
DLL-AS-LDL-CNL-MSFL-GR-AMS	1:200	3248.0	590
CSAT (Checkshot)		3245.5	600
CST-GR (Sidewall cores)	(30 shots/ 23 Rec)	3207.0	2888.0

## 7. TEMPERATURE RECORD

Logging Run (Suite 1)	Depth (m)	Max Recorded Temperature °C	Time After Circulation Stopped (t) (hours)
DLL-AS-LDL-CNL-MSFL-GR-AMS	3206.0	65.6	12 hrs, 30 min.
CSAT (Checkshot)	3207.0	70.6	21 hrs
CST-GR (Sidewall cores)	---	---	---

**FIGURES**

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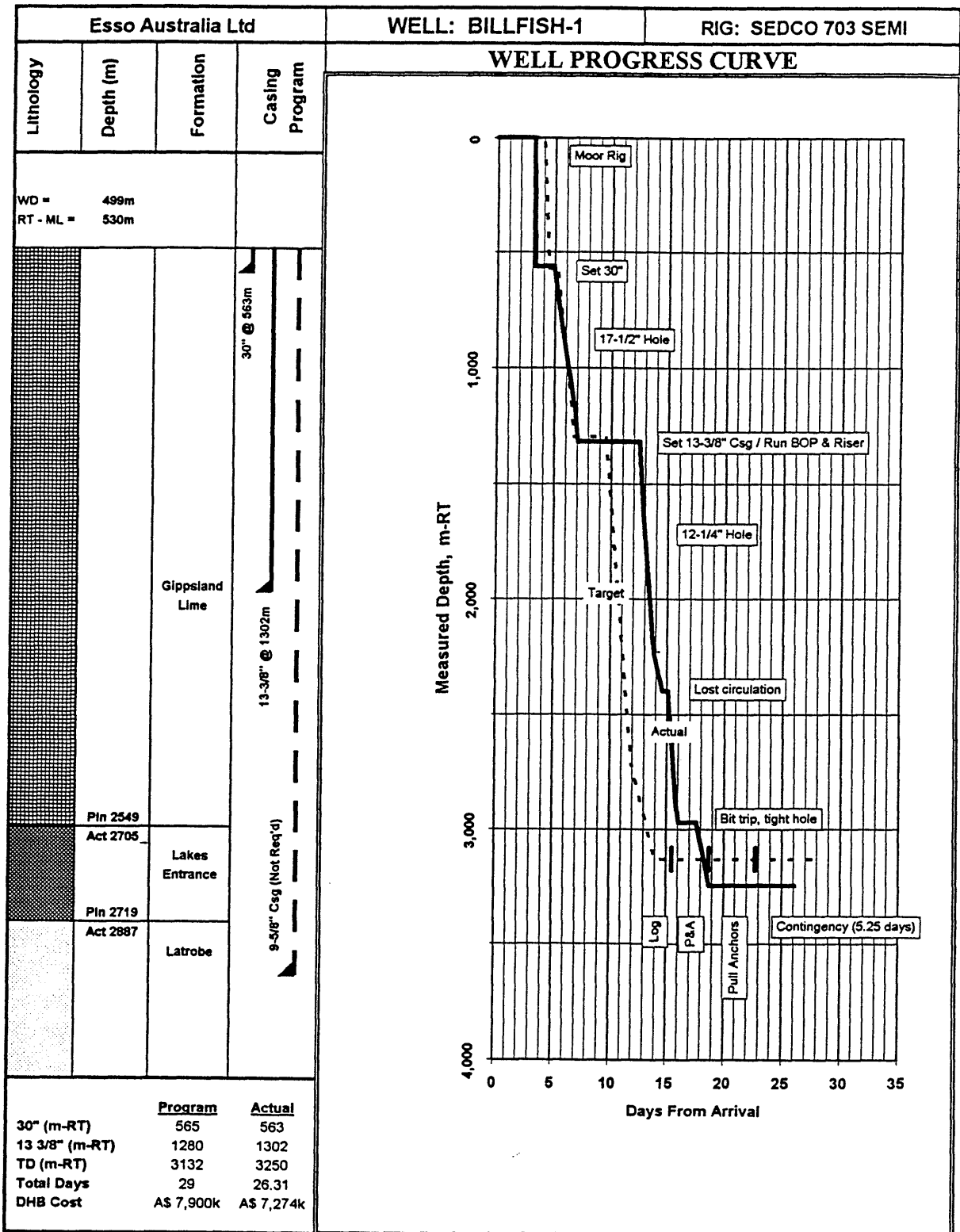


Figure 2

ESSO AUSTRALIA LTD.  
**BILLFISH-1**  
**P&A SCHEMATIC**

RKB

MSL @ 31m RKB

WATER DEPTH = 499m

TGB LEFT ON SEA FLOOR

ML @ 530m

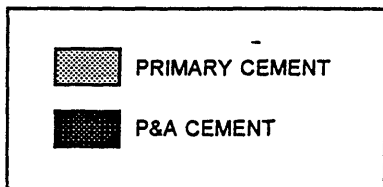
TOC @ SEAFLOOR  
 BOTH CASINGS

36" HOLE TO 563m

30" 310# X-52  
 SHOE @ 563m

17-1/2" HOLE TO 1317m

13-3/8" 68# K-55 BTC  
 SHOE @ 1302m



TOP OF LATROBE  
 @ 2887m RKB

T.D. @ 3250m

CUT 20" x 30" CASING @ 535m  
 (5m below sea floor)

CEMENT PLUG: 650-550m

BRIDGE PLUG @ 655m (tagged)

SEAWATER

Plug #4

MW 10.0 ppg  
 10% NaCl / 3% KCl / PHPA MUD  
 treated with 0.2 ppb corrosion inhibitor  
 pH = 10.5+

Plug #3

MW 10.0 ppg  
 10% NaCl / 3% KCl / PHPA MUD

CEMENT PLUG: 1350-1206m  
 (tagged & tested to 1,000 psi)

Plug #2

MW 10.0 ppg  
 10% NaCl / 3% KCl / PHPA MUD

CEMENT PLUG: 2385-2235m

THEIR ZONE @ ±2400m

Plug #1

MW 10.0 ppg  
 10% NaCl / 3% KCl / PHPA MUD

CEMENT PLUG: 2970-2815m (tagged)

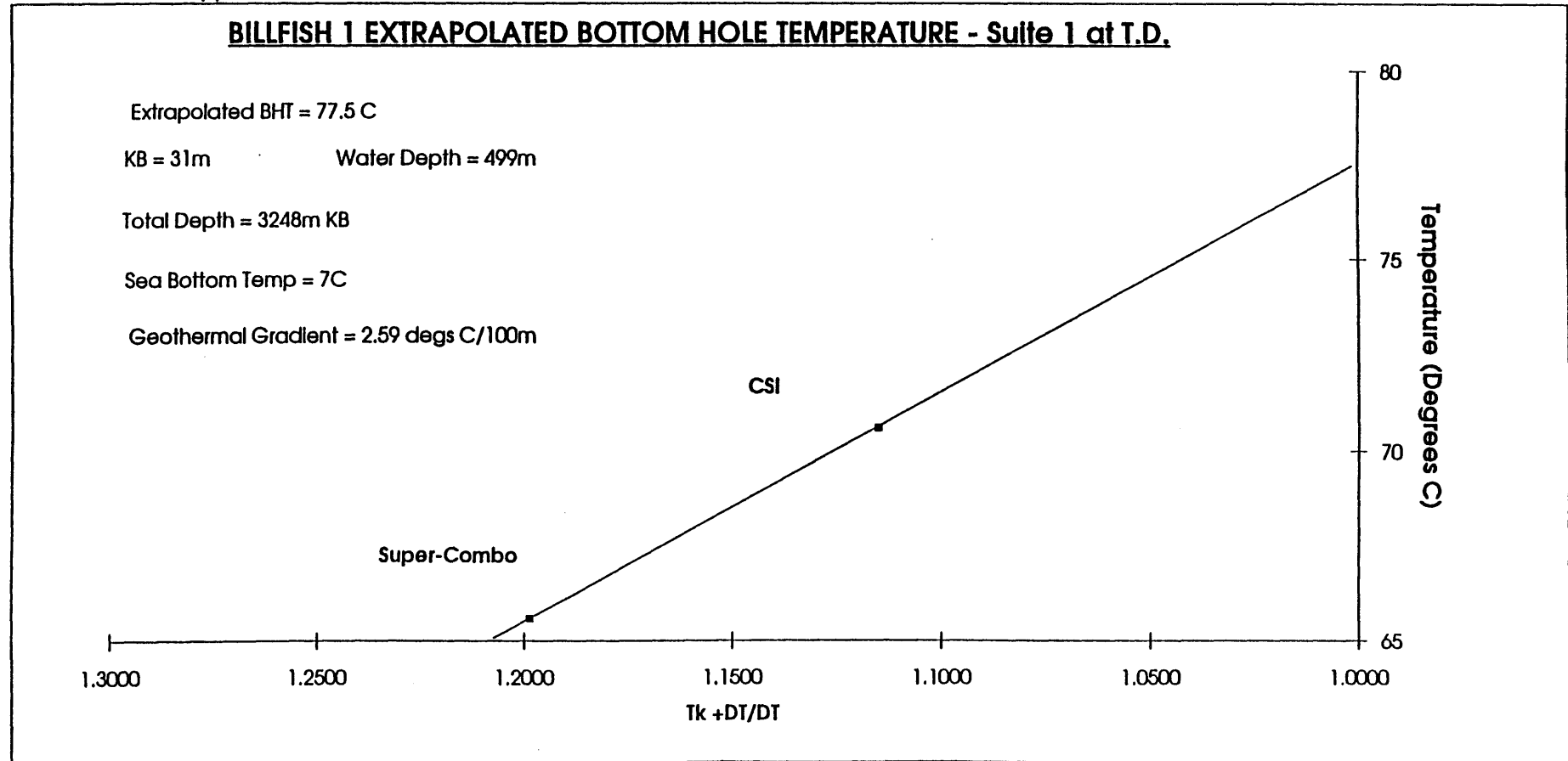
ALL DEPTHS FROM RKB

**Figure 3**

**EXTRAPOLATED BOTTOM HOLE TEMPERATURE**

<b>Well</b>	Billfish 1	<b>Extrapolated BHT =</b>	77.5	<b>Water Depth=</b>	499
<b>Basin</b>	Gippsland Basin	<b>TD =</b>	3248	<b>Sea Floor Temp =</b>	7
<b>Date</b>	24/02/97	<b>KB =</b>	31	<b>Geothermal Grad =</b>	2.59 Degrees/100m
<b>Rig</b>	Sedco 703				

<b>Suite 1</b>		<b>Logs Run</b>	<b>Time on bottom</b>	<b>Max Temp (degs C)</b>	<b>Delta T</b>	<b>Tk+dT/dT</b>
<b>Circulation Time (hours) (Tk)</b>	2.5	Super-Combo	6/02/97 17:35	65.6	12.58	1.1987
<b>Time Circulation Stopped: 1</b>	6/02/97 5:00	CSAT	7/02/97 2:45	70.6	21.75	1.1149
<b>Time Circulation Stopped: 2</b>						



*APPENDICES*

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# APPENDIX 1



5th Cut  
A4 Dividers  
Re-order Code 97052

**APPENDIX I**

***LITHOLOGY(CUTTINGS) DESCRIPTIONS***

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LITHOLOGY DESCRIPTIONS

<u>Depth</u>	<u>%</u>	<u>Description</u>
		First returns from 1317m after running riser.
1330	100	<u>LIMESTONE</u> : Light to medium grey, calcilutite, slightly silty, micritic, trace carbonaceous fragments, soft to plastic, massive to blocky.
1360	100	<u>LIMESTONE</u> : Light to medium grey, pale grey, calcilutite, locally becomes moderately silty grades to calcisiltite, micritic, common carbonaceous fragments, trace very fine calcareous sand in part, soft to plastic, massive to blocky.
1390	100	<u>LIMESTONE</u> : Light to medium grey, pale grey in part, calcilutite grades to calcisiltite, locally very silty, micritic, common carbonaceous fragments, trace very fine calcareous sand, rare forams, soft to plastic, massive to blocky, amorphous.
1420	100	<u>LIMESTONE</u> : Predominantly as above, becomes calcisiltite, moderately to very argillaceous, trace forams.
1450	100	<u>LIMESTONE</u> : As above, calcisiltite grades to calcilutite.
1480	100	<u>LIMESTONE</u> : Light to medium grey, calcisiltite locally moderately argillaceous grades to calcilutite, micritic, trace carbonaceous fragments, trace fine calcareous sand, occasionally light brown grey calcarenite inclusions, soft to plastic, firm in part, massive to blocky.
1510	100	<u>LIMESTONE</u> : Light grey to occasionally medium grey, light brown grey, calcisiltite, locally moderately argillaceous grades to calcilutite, trace very fine calcareous sand, trace

carbonaceous fragments, soft to plastic, firm, massive to blocky.

1540 100

LIMESTONE: Predominantly as above, rare glauconite, trace light brown grey very fine grained calcarenite inclusions.

1570 100

LIMESTONE: Light to medium grey, occasionally light brown grey, calcisiltite locally becomes very argillaceous grades to calcilutite, trace very fine calcareous sand, trace carbonaceous fragments, trace forams, trace white birdseye calcite infill in part, soft to firm, massive to blocky.

1600	100	<u>LIMESTONE</u> : Predominantly as above, becomes very argillaceous grades to calcilutite in part.
1630	100	<u>LIMESTONE</u> : Light to medium grey, brown grey in part, calcisiltite, locally moderately argillaceous, micritic, trace fossil fragments, trace slightly dolomitised spicules, trace carbonaceous fragments, occasionally very fine light brown calcarenite inclusions, soft to firm, massive to blocky.
1660	100	<u>LIMESTONE</u> : Light to medium grey, calcisiltite, moderately argillaceous, common very fine calcareous sand, locally common carbonaceous fragments, rare glauconite, soft to firm, plastic in part, massive to blocky.
1690	100	<u>LIMESTONE</u> : Predominantly as above, calcisiltite locally becomes very argillaceous calcilutite, rare slightly dolomitised fossil fragments.
1720	100	<u>LIMESTONE</u> : Predominantly as above, locally becomes light to pale grey, very argillaceous in part grades to calcilutite.
1750	100	<u>LIMESTONE</u> : Medium grey, brown grey, calcisiltite, moderately argillaceous, locally very fine calcareous sand grades to calcarenite in part, trace microcrystalline medium brown dolomitic inclusions, rare glauconite, firm to occasionally moderately hard, blocky.
1780	100	<u>LIMESTONE</u> : Predominantly as above, calcisiltite grades to calcarenite, very fine grained, trace ooids.
1810	100	<u>LIMESTONE</u> : Medium dark grey, brown grey, calcilutite, locally silty, trace carbonaceous flecks, occasionally light brown grey very fine grained calcarenite inclusions, soft to firm, massive to blocky.

1840	100	<u>LIMESTONE</u> : Predominantly as above, becomes slightly silty grades to calcisiltite, trace forams & fossil fragments, trace medium brown cryptocrystalline hard dolomitic inclusions.
1870	100	<u>LIMESTONE</u> : Light brown grey, pale grey, calcilutite, slightly silty, trace carbonaceous specks, rare very fine calcareous sand, soft to plastic, slightly sticky, massive to amorphous.
1900	100	<u>LIMESTONE</u> : Medium grey, brown grey, calcisiltite grades to very fine grained calcarenite, slightly argillaceous, micritic, trace carbonaceous specks, trace sponge spicules, soft to firm, massive.
1930	100	<u>LIMESTONE</u> : Predominantly as above, calcisiltite grades to calcarenite in part, moderately argillaceous.
1950	100	<u>LIMESTONE</u> : Medium grey to brown grey, occasionally olive grey, calcisiltite, moderately argillaceous, micritic, trace carbonaceous specks, rare glauconite, trace medium brown very fine calcarenite inclusions, firm to soft, blocky.
1960	100	<u>LIMESTONE</u> : Predominantly as above, becomes moderately to very argillaceous calcisiltite grades to calcilutite.
1970	100	<u>LIMESTONE</u> : Predominantly as above, calcisiltite grades to calcilutite, trace forams, trace white calcite birdseye infill.
1980	100	<u>LIMESTONE</u> : medium grey to brown grey, calcisiltite, locally becomes very argillaceous grades to calcilutite, micritic, trace white calcite infill in part, trace to locally common carbonaceous fragments, trace very fine light brown

			calcarenite inclusions, soft to firm, massive to blocky.
1990	100		<u>LIMESTONE</u> : Medium grey, brown grey, calcisiltite grades to calcilutite, moderately argillaceous, micritic, rare glauconite, trace carbonaceous fragments, trace white calcite infill, trace very fine light brown calcarenite inclusions, soft to firm, slightly dispersive in part, sticky, massive to blocky, amorphous.
2000	100		<u>LIMESTONE</u> : Predominantly as above, becomes moderately to very argillaceous, calcisiltite grades to calcilutite.
2010	100		<u>LIMESTONE</u> : As above.
2020	100		<u>LIMESTONE</u> : Brown grey, medium grey in part, calcisiltite, moderately to very argillaceous grades to calcilutite in part, micritic, trace carbonaceous specks, rare fossil/spicule fragments, trace very fine calcareous sand, soft to firm, massive.
2030	100		<u>LIMESTONE</u> : As above, calcisiltite grades to calcilutite.
2040	100		<u>LIMESTONE</u> : Brown grey to olive grey, calcisiltite grades to calcilutite, moderately to very argillaceous, trace fine calcareous sand, micritic, rare carbonaceous specks, locally common spicules, firm to occasionally moderately hard, blocky.
2050	100		<u>LIMESTONE</u> : Brown grey, olive grey in part, calcisiltite grades to very fine calcarenite in part, moderately argillaceous, rare glauconite, micritic, trace white calcite infill, trace carbonaceous specks, firm, soft to sticky in part, massive to blocky.
2060	100		<u>LIMESTONE</u> : Predominantly as above, calcisiltite, becomes moderately to very

		argillaceous in part, trace glauconite, rare forams.
2070	100	<u>LIMESTONE</u> : Predominantly as above, calcisiltite grades to very fine calcarenite in part.
2080	100	<u>LIMESTONE</u> : Brown grey to olive grey, calcisiltite, moderately to very argillaceous, micritic, trace carbonaceous fragments, trace fine calcareous sand, trace dark brown cryptocrystalline dolomitic inclusions, firm to occasionally moderately hard, blocky.
2090	100	<u>LIMESTONE</u> : As above.
2100	100	<u>LIMESTONE</u> : Predominantly as above, calcisiltite becomes increasingly argillaceous grades to calcilutite in part.
2110	100	<u>LIMESTONE</u> : Brown grey, calcilutite locally grades to very fine calcarenite, moderately argillaceous, micritic, trace glauconite, trace white calcite infill, trace carbonaceous specks, soft to firm, massive to blocky.
2120	100	<u>LIMESTONE</u> : As above.
2130	100	<u>LIMESTONE</u> : As above.
2140	100	<u>LIMESTONE</u> : Brown grey to olive grey, calcisiltite moderately to very argillaceous grades to calcilutite, micritic, trace very fine calcareous sand, trace carbonaceous flecks, rare glauconite, trace white calcite infill, soft to firm, slightly dispersive, massive to blocky.
2150	100	<u>LIMESTONE</u> : Predominantly as above, becomes brown grey, locally common very fine rounded calcareous sand, becomes firm.
2160	100	<u>LIMESTONE</u> : Medium grey to brown grey, calcisiltite becomes very fine



		grades to calcarenite, moderately argillaceous, micritic, locally common fossil fragments and forams, trace glauconite, firm, massive to blocky.
2170	100	<u>LIMESTONE</u> : Predominantly as above, calcisiltite, trace carbonaceous flecks, occasionally moderately hard very fine calcarenite inclusions.
2180	100	<u>LIMESTONE</u> : Predominantly as above, calcisiltite locally moderately argillaceous, trace fossil fragments and spicules, trace carbonaceous flecks, becomes soft to firm, slightly sticky in part, massive to blocky.
2190	100	<u>LIMESTONE</u> : As above, calcisiltite.
2200	100	<u>LIMESTONE</u> : Light brown grey, calcarenite, fine to very fine, trace calcite spar/dolomitic cement, slightly to occasionally moderately argillaceous, trace glauconite, trace fossil fragments, firm to moderately hard, blocky, tight.
2210	100	<u>LIMESTONE</u> : Predominantly as above, light brown grey to light grey, pale grey, occasionally off white, calcarenite becomes very fine grained grades to calcisiltite in part.
2220	100	<u>LIMESTONE</u> : As above.
2230	100	<u>LIMESTONE</u> : Predominantly as above, locally weak dolomitic cement and dolarenite inclusions.
2240	100	<u>LIMESTONE</u> : Medium grey to brown grey, calcarenite grades to calcisiltite, very fine, slightly to moderately argillaceous, micritic, weak dolomitic cement in part, trace carbonaceous fragments, rare glauconite, trace fossil fragments, moderately hard to firm, blocky.
2250	100	<u>LIMESTONE</u> : As above.

2260	100	<u>LIMESTONE</u> : Brown grey to olive grey, calcisiltite grades to very fine calcarenite in part, moderately argillaceous, micritic, trace carbonaceous specks, firm, blocky to massive.
2270	100	<u>LIMESTONE</u> : Medium to dark grey, olive grey in part, calcisiltite, moderately argillaceous, micritic, trace very fine calcareous sand in part trace carbonaceous specks, soft to firm, massive to blocky.
2280	100	<u>LIMESTONE</u> : As above.
2290	100	<u>LIMESTONE</u> : medium grey, brown grey, calcisiltite, moderately argillaceous, micritic, trace carbonaceous specks, trace fossil fragments/spicules, trace to common light brown microcrystalline very fine dolarenite inclusions.
2300	100	<u>LIMESTONE</u> : As above.
2310	100	<u>LIMESTONE</u> : As above.
2320	100	<u>LIMESTONE</u> : brown grey to olive grey, calcisiltite, moderately to very argillaceous locally grades to calcilutite, trace very fine calcite sand, trace carbonaceous specks, slightly dolomitic in part, soft to firm, blocky to platy.
2330	100	<u>LIMESTONE</u> : Predominantly as above, trace fossil fragments/spicules.
2340	100	<u>LIMESTONE</u> : brown grey, medium grey, calcisiltite becomes very fine grades to calcarenite in part, moderately argillaceous, micritic, trace carbonaceous fragments, soft to firm, blocky.
2350	100	<u>LIMESTONE</u> : Medium grey to brown grey, calcarenite becomes silty grades to calcisiltite, very fine, micritic, trace fossil fragments/spicules, rare forams, trace carbonaceous fragments, rare

glaucanite, firm to moderately hard, blocky.

2360 100 LIMESTONE: Predominantly as above, trace spar cement in part, moderately hard in part.

2370 100 LIMESTONE: Predominantly as above, calcarenite becomes very silty grades to calcisiltite, moderately argillaceous.

From 2370m to 2400m partial sample returns due to losses at 2400m. From 2400m to 2890m sample interval varied between 5m and 10m due to high penetration rate.

2405 100 LIMESTONE: Light brown grey, light grey, brown grey, calcisiltite, slightly to moderately argillaceous, micritic, rare glaucanite, locally common light brown very fine to microcrystalline calcarenite inclusions, trace carbonaceous fragments, soft to firm, massive to blocky.

2410 100 LIMESTONE: As above.

2415 100 LIMESTONE: As above.

2420 100 LIMESTONE: Predominantly as above, becomes pale grey, calcisiltite locally becomes very argillaceous, trace fine calcareous sand in part.

2425 100 LIMESTONE: Light grey, light brown grey, occasionally off white, calcisiltite, moderately to very argillaceous, trace very fine calcareous sand, trace carbonaceous fragments, rare microglaucanite, occasionally very fine light brown calcarenite inclusions, soft to firm, occasionally moderately hard, blocky.

2430 100 LIMESTONE: Predominantly as above, calcisiltite grades to calcilutite.

2435 100 LIMESTONE: brown grey, olive grey, calcilutite, locally becomes very argillaceous grades to calcareous claystone in part, slightly silty, micritic,

		trace light brown grey very fine calcarenite inclusions, trace carbonaceous fragments and flecks, soft to firm, blocky to platy in part.
2440	100	<u>LIMESTONE</u> : As above.
2445	100	<u>LIMESTONE</u> : Light grey, brown grey, calcilutite, locally becomes silty grades to calcisiltite in part, locally trace very fine calcarenite inclusions, trace glauconite, trace carbonaceous specks, firm, blocky to platy in part.
2450	100	<u>LIMESTONE</u> : As above.
2455	100	<u>LIMESTONE</u> : Light to medium grey, occasionally brown grey, calcilutite, slightly to moderately argillaceous grades to calcareous claystone in part, silty in part, trace glauconite, trace carbonaceous specks, trace light brown dolarenite inclusions, marly texture, soft to firm, massive to blocky.
2460	100	<u>LIMESTONE</u> : Predominantly as above, trace fossil fragments.
2465	100	<u>LIMESTONE</u> : As above.
2470	100	<u>LIMESTONE</u> : Light brown to light grey, brown grey, calcilutite locally silty grades to calcisiltite, trace glauconite, trace carbonaceous specks and flecks, trace light brown very fine calcarenite inclusions, marly texture, soft to firm, massive to blocky.
2475	100	<u>LIMESTONE</u> : As above.
2480	100	<u>LIMESTONE</u> : Predominantly as above, marly texture, soft to firm, slightly dispersive, massive to blocky, amorphous.
2485	100	<u>LIMESTONE</u> : Light brown, light grey brown, calcilutite grades to calcisiltite, moderately argillaceous, micritic, trace carbonaceous specks and flecks, trace

			very fine light brown calcarenite inclusions, rare fossil fragments/forams, marly texture, soft to firm, slightly dispersive, massive to blocky.
2490	100		<u>LIMESTONE</u> : As above.
2500	70		<u>LIMESTONE</u> : Predominantly as above, becomes light grey to light brown grey, trace white to pale grey very fine calcarenite inclusions, trace fossil fragments.
	30		<u>CLAYSTONE</u> : Medium grey to olive grey, moderately calcareous grades to calcareous claystone, rare carbonaceous specks, homogeneous, smooth, waxy texture, soft to plastic, blocky.
2505	30		<u>CLAYSTONE</u> : As above.
	70		<u>LIMESTONE</u> : As above.
2510	70		<u>CLAYSTONE</u> : Predominantly as above, slightly silty.
	30		<u>LIMESTONE</u> : As above.
2515	70		<u>CLAYSTONE</u> : As above.
	30		<u>LIMESTONE</u> : As above.
2520	80		<u>CLAYSTONE</u> : As above.
	20		<u>LIMESTONE</u> : Predominantly as above, trace forams, trace dolomitised fossil fragments.
2525	80		<u>CLAYSTONE</u> : As above.
	20		<u>LIMESTONE</u> : As above.
2530	60		<u>CLAYSTONE</u> : Medium grey, olive grey, moderately to locally calcareous grades to calcareous claystone in part, slightly silty in part, rare disseminated pyrite, homogeneous, soft to plastic, blocky.
	40		<u>LIMESTONE</u> : Light to medium grey, brown grey, calcilutite, slightly silty, trace to rare very fine calcareous sand, soft to firm, massive to blocky.
2535	60		<u>CLAYSTONE</u> : As above.
	40		<u>LIMESTONE</u> : As above.

2540	80	<u>CLAYSTONE</u> : Medium grey to brown grey, olive grey, moderately to locally very calcareous grades to calcareous claystone, slightly silty, trace carbonaceous specks, soft to firm, blocky.
	20	<u>LIMESTONE</u> : As above.
2545	80	<u>CLAYSTONE</u> : As above.
	20	<u>LIMESTONE</u> : As above.
2550	70	<u>CLAYSTONE</u> : Predominantly as above, very calcareous grades to calcareous claystone, trace disseminated pyrite, rare pyritized fossil fragments, trace forams, soft to plastic, slightly dispersive, massive to amorphous.
	30	<u>LIMESTONE</u> : As above.
2555	70	<u>CLAYSTONE</u> : As above.
	30	<u>LIMESTONE</u> : As above.
2560	90	<u>CLAYSTONE</u> : As above, grades to calcareous claystone.
	10	<u>LIMESTONE</u> : As above.
2570	100	<u>CLAYSTONE</u> : Medium grey to olive grey, moderately calcareous, slightly silty, trace fine calcareous sand, rare forams, trace carbonaceous specks, soft to firm, massive to blocky.
2580	100	<u>CLAYSTONE</u> : Predominantly as above, trace pyrite nodules.
2590	100	<u>CLAYSTONE</u> : Medium grey, olive grey, moderately calcareous, slightly to moderately silty, trace white calcite infill, trace disseminated pyrite, trace carbonaceous fragments, firm, massive to blocky.
2600	100	<u>CLAYSTONE</u> : Predominantly as above, trace fine calcareous sand.
2610	100	<u>CLAYSTONE</u> : Medium grey to olive grey moderately to local very calcareous grades to calcareous claystone, slightly

		silty, trace disseminated pyrite, slightly micromicaceous, homogeneous, waxy texture in part, plastic in part, massive to blocky.
2620	100	<u>CLAYSTONE</u> : As above.
2630	100	<u>CLAYSTONE</u> : Medium grey, olive grey, moderately calcareous, slightly silty, trace to rare disseminated pyrite, trace carbonaceous specks, trace very fine calcarenite inclusions in part, homogeneous, firm blocky.
2640	100	<u>CLAYSTONE</u> : medium grey, medium dark grey, olive grey, slightly to moderately calcareous, slightly silty, trace carbonaceous specks, trace forams in part, trace disseminated pyrite, soft to firm, massive.
2650	100	<u>CLAYSTONE</u> : Predominantly as above, locally common disseminated pyrite.
2660	100	<u>CLAYSTONE</u> : As above.
2670	100	<u>CLAYSTONE</u> : Medium grey, medium dark grey, slightly to moderately calcareous, slightly to moderately silty, trace carbonaceous specks, trace very fine calcarenite inclusions in part, trace white calcite infill, slightly micromicaceous, soft, occasionally firm, massive to blocky in part.
2680	100	<u>CLAYSTONE</u> : Predominantly as above, becomes medium grey.
2690	100	<u>CLAYSTONE</u> : Predominantly as above, trace nodular pyrite, rare microglaucanite.
2700	100	<u>CLAYSTONE</u> : Medium grey, medium green grey, slightly calcareous, slightly silty, trace disseminated pyrite, rare Fe stained medium quartz, trace carbonaceous specks, soft, massive to blocky.

2710	100	<u>CLAYSTONE</u> : Medium dark grey, olive grey, slightly calcareous, trace carbonaceous specks, slightly micromicaceous, soft to firm, blocky.
2720	100	<u>CLAYSTONE</u> : Predominantly as above, medium dark grey, dark green grey, trace microglauconite.
2730	100	<u>CLAYSTONE</u> : Predominantly as above, trace cryptoglaconite.
2740	100	<u>CLAYSTONE</u> : Medium dark grey, olive grey, slightly calcareous, slightly to moderately silty, trace disseminated pyrite, trace fine calcareous sand in part, rare forams, trace microglauconite, soft, massive to blocky.
2750	100	<u>CLAYSTONE</u> : As above.
2760	100	<u>CLAYSTONE</u> : Light to medium grey, olive grey, slightly calcareous, slightly silty, trace carbonaceous specks, trace lithic fragments, homogeneous, soft to firm, blocky to massive.
2770	100	<u>CLAYSTONE</u> : Medium dark grey to olive grey, moderately to very calcareous, slightly silty in part, trace disseminated pyrite, rare carbonaceous specks, homogeneous, soft to plastic in part, massive to blocky.
2780	100	<u>CLAYSTONE</u> : Medium dark grey to olive grey, moderately calcareous, slightly silt, trace carbonaceous specks, trace disseminated nodular pyrite, trace fine calcareous sand, rare fossil fragments, soft to firm, massive to blocky.
2790	100	<u>CLAYSTONE</u> : Predominantly as above, trace micro- & cryptoglaconite.
2800	100	<u>CLAYSTONE</u> : Predominantly as above, becomes olive grey to dark green grey, moderately calcareous.



2810	100	<u>CLAYSTONE</u> : As above.
2820	100	<u>CLAYSTONE</u> : Medium grey to brown grey, slightly to moderately calcareous, slightly silty, trace carbonaceous specks, rare nodular pyrite, rare microglauconite, soft to slightly dispersive, firm in part, massive to blocky.
2830	100	<u>CLAYSTONE</u> : As above.
2840	100	<u>CLAYSTONE</u> : Light to medium grey, occasionally olive grey, slightly calcareous, slightly silty, trace carbonaceous specks, trace nodular pyrite, rare cryptoglaconite, soft to firm, massive to blocky.
2850	100	<u>CLAYSTONE</u> : As above.
2860	100	<u>CLAYSTONE</u> : Predominantly as above, occasionally dark green grey, micromicaceous in part, predominantly firm, blocky.
2870	100	<u>CLAYSTONE</u> : Predominantly as above, locally very silty grades to siltstone in part, common nodular/disseminated pyrite, rare Fe stained quartz float.
2880	100	<u>CLAYSTONE</u> : As above, trace Fe stained quartz.
2890	5	<u>SILTSTONE</u> : Dark brown, brown grey, very argillaceous, trace glauconite, trace biotite, micromicaceous, trace limonitic staining, trace fine to medium milky quartz float, soft, massive to blocky.
	95	<u>CLAYSTONE</u> : As above.
2895	40	<u>SILTSTONE</u> : Dark brown, brown grey, very argillaceous, common pelletoidal glauconite, trace nodular pyrite, micromicaceous, trace Fe stained coarse quartz, trace coarse milky quartz, trace limonitic staining, soft, massive.

	60	<u>CLAYSTONE</u> : Pale grey to off white, slightly to non calcareous, very silty, slightly micromicaceous, very soft to dispersive, massive to amorphous.
2900	80	<u>SILTSTONE</u> : Predominantly as above, abundant micro- & pelletoidal glauconite, trace biotite.
	20	<u>CLAYSTONE</u> : Predominantly as above, occasionally becomes medium grey, locally moderately silty, slightly siliceous in part.
2905	90	<u>SILTSTONE</u> : Dark brown, dark brown grey, dark green, very argillaceous, abundant micro- & pelletoidal glauconite, trace nodular pyrite, trace very coarse to granular Fe stained quartz, micromicaceous, rare limonitic staining, soft to slightly dispersive, massive to amorphous.
	10	<u>CLAYSTONE</u> : Off white to light grey, occasionally medium grey, slightly silty in part, occasionally slightly siliceous, trace lithic fragments, micromicaceous, soft to firm, occasionally moderately hard, slightly dispersive in part, massive to blocky.
2910	90	<u>SILTSTONE</u> : As above.
	10	<u>CLAYSTONE</u> : As above.
2915	100	<u>SILTSTONE</u> : Predominantly as above, becomes dark green grey in part.
	Trace	<u>CLAYSTONE</u> : As above.
2920	20	<u>SANDSTONE</u> : Clear to translucent, frosted, very coarse to granular, subangular to subrounded, poor to moderately sorted, trace pyritic, cement, clean, common milky quartz, trace nodular pyrite, loose, very good porosity, no fluorescence.
	80	<u>SILTSTONE</u> : As above.
2925	70	<u>SANDSTONE</u> : Clear to translucent, frosted, medium to very coarse, occasionally granular, angular to subrounded, poor sorting, trace pyritic

			cement & nodules, trace kaolinitic matrix, common very coarse milky quartz, trace feldspar, loose, very good porosity, no fluorescence.
		30	<u>SILTSTONE</u> : Light to medium grey, light brown grey, very argillaceous, micromicaceous, trace carbonaceous specks, trace lithic fragments, soft to firm, massive to blocky.
2930		70	<u>SANDSTONE</u> : As above.
		30	<u>SILTSTONE</u> : As above.
2935		90	<u>SANDSTONE</u> : Predominantly as above, becomes medium to very coarse, predominantly medium to coarse.
		10	<u>SILTSTONE</u> : As above.
2940		100	<u>SANDSTONE</u> : Clear to translucent, frosted, medium to coarse, occasionally very coarse, subangular to subrounded, poor to moderate sorting, trace pyritic cement, clean, rare feldspar, common smoky quartz, loose, good porosity, no porosity.
		Trace	<u>SILTSTONE</u> : As above.
2945		90	<u>SANDSTONE</u> : Predominantly as above, medium to coarse, predominantly medium.
		10	<u>SILTSTONE</u> : As above.
2950		80	<u>SANDSTONE</u> : Clear to translucent, frosted, medium to occasionally coarse, subangular to subrounded, moderate to good sorting, trace pyritic cement, trace kaolinitic matrix, trace coarse biotite, trace glauconite, loose, good porosity, no fluorescence.
		20	<u>SILTSTONE</u> : Light grey, off white, light brown grey, very argillaceous, arenaceous in part grades to arenaceous siltstone, trace biotite, trace carbonaceous specks, trace lithic fragments, soft to firm, massive to amorphous.
2955		70	<u>SANDSTONE</u> : Predominantly as above, becomes coarse to very coarse,

		30	<p>trace very fine grained dolarenite inclusions.</p> <p><u>SILTSTONE</u>: As above.</p>
2960		90	<p><u>SANDSTONE</u>: Predominantly as above, becomes medium to coarse.</p>
		10	<p><u>SILTSTONE</u>: As above.</p>
2965		100	<p><u>SANDSTONE</u>: Clear to translucent, frosted, medium to coarse, subangular to subrounded, good sorting, clean, common pelletoidal glauconite, trace nodular pyrite, common milky/smoky quartz, loose, good porosity, no fluorescence.</p>
2968		100	<p><u>SANDSTONE</u>: Predominantly as above, common kaolinitic matrix.</p>
		Trace	<p><u>SILTSTONE</u>: Light grey, off white, light brown grey, very argillaceous, slightly arenaceous in part, trace biotite, trace carbonaceous specks, trace lithic fragments, soft to firm, massive to amorphous.</p>
2970		100	<p><u>SANDSTONE</u>: Clear to translucent, frosted, fine to predominantly medium, occasionally coarse, subangular to subrounded, moderate sorting, clean, trace coarse milky/smoky quartz, trace to rare pelletoidal glauconite, good porosity, no fluorescence.</p>
		Trace	<p><u>SILTSTONE</u>: Light grey, light to medium grey, very argillaceous, trace lithic fragments, trace biotite, slightly micromicaceous, soft to firm in part, massive.</p>
2975		20	<p><u>SANDSTONE</u>: Clear to translucent, frosted, medium to predominantly coarse to very coarse, angular to subangular, poor sorting, clean, trace very coarse milky quartz, rare Fe stained quartz, loose, good porosity, no fluorescence.</p>
		80	<p><u>SILTSTONE</u>: Light to medium grey, brown grey, very argillaceous, trace carbonaceous specks, micromicaceous, trace lithic fragments, firm to</p>

			moderately hard, locally becomes very argillaceous grades to claystone in part.
2980	60		<u>SANDSTONE</u> : Predominantly as above, becomes medium to coarse, trace kaolinitic matrix, trace pelletal glauconite, trace lignitic fragments, no fluorescence.
	40		<u>SILTSTONE</u> : As above.
2985	40		<u>SANDSTONE</u> : Clear to translucent, frosted, medium to predominantly coarse to very coarse, angular to subangular, occasionally subrounded, poor sorting, locally weak calcareous/dolomitic cement, predominantly clean, common milky/smoky very coarse fractured quartz, trace kaolinitic inclusions, trace lignitic inclusions, loose, occasionally hard aggregates, good porosity, trace dull gold mineral fluorescence only.
	60		<u>SILTSTONE</u> : Predominantly as above, becomes very argillaceous grades to claystone in part.
2990	80		<u>SANDSTONE</u> : Predominantly as above, becomes medium to coarse, locally common kaolinitic matrix & inclusions, rare quartz overgrowths, fair to good porosity, mineral fluorescence only.
	20		<u>SILTSTONE</u> : As above.
2995	40		<u>SANDSTONE</u> : Clear to translucent, frosted, coarse to very coarse, occasionally granular to pebble, angular to subrounded, poor sorting, trace pyritic cement and nodules, trace kaolinitic matrix, trace milky quartz pebbles, loose, good porosity, no fluorescence.
	60		<u>SILTSTONE</u> : Medium brown grey, light to medium grey, very argillaceous locally grades to claystone, slightly micromicaceous, trace carbonaceous specks, trace fine quartz sand in part, soft to occasionally firm, massive to blocky.

	Trace	<u>COAL</u> : Black, brown black, very argillaceous in part, dull to subvitreous lustre, lignitic, earthy, brittle, blocky to subfissile.
3000	90	<u>SANDSTONE</u> : Predominantly as above, dull gold mineral fluorescence only.
	10	<u>SILTSTONE</u> : As above.
3005	100	<u>SANDSTONE</u> : Clear to translucent, frosted, medium to predominantly coarse to very coarse, angular to subrounded, poor to moderate sorting, occasionally weak calcareous cement, trace to common kaolinitic matrix, common very coarse milky quartz, trace nodular pyrite, loose, good porosity, trace dull gold mineral fluorescence only.
3010	100	<u>SANDSTONE</u> : As above.
	Trace	<u>CLAYSTONE</u> : Medium grey, brown grey, occasionally slightly siliceous, slightly silty, trace lithic fragments, slightly micromicaceous, trace carbonaceous specks, smooth, soft to firm, massive to blocky.
3015	100	<u>SANDSTONE</u> : As above.
	Trace	<u>CLAYSTONE</u> : As above.
3020	80	<u>SANDSTONE</u> : Predominantly as above, becomes medium to coarse, occasionally very coarse, common kaolinitic matrix, trace nodular pyrite, loose, fair to good porosity, mineral fluorescence only.
	20	<u>CLAYSTONE</u> : As above.
	Trace	<u>COAL</u> : Black, brown black, slightly silty, dull to subvitreous lustre, earthy, brittle, blocky to subfissile.
3025	90	<u>SANDSTONE</u> : Clear to translucent, frosted, medium to predominantly coarse to very coarse, angular to subrounded, poor sorting, trace siliceous cement in part, locally trace kaolinitic matrix, trace nodular pyrite,

			rare pelletoidal glauconite, loose, good to very good porosity, mineral fluorescence only.
		10	<u>CLAYSTONE</u> : Light to medium grey, brown grey, slightly siliceous in part, slightly silty, trace carbonaceous specks, micromicaceous, soft to firm, moderately hard, blocky.
3030	80		<u>SANDSTONE</u> : As above.
	20		<u>CLAYSTONE</u> : As above.
	Trace		<u>COAL</u> : Black, brown black, moderately argillaceous, subvitreous to dull lustre, trace disseminated pyrite, lignitic, brittle, fissile to blocky.
3035	80		<u>SANDSTONE</u> : As above.
	20		<u>CLAYSTONE</u> : As above.
	Trace		<u>COAL</u> : As above.
3040	90		<u>SANDSTONE</u> : Predominantly as above, becomes coarse to very coarse, trace to common kaolinitic matrix, common milky/smoky quartz, good porosity, mineral fluorescence only.
	10		<u>CLAYSTONE</u> : As above.
3045	80		<u>SANDSTONE</u> : Clear to translucent, frosted, medium to coarse, occasionally very coarse, subangular to subrounded, moderate sorting, weak siliceous/calcareous cement in part, locally common kaolinitic matrix, trace pelletoidal glauconite, common very coarse milky/smoky quartz, trace nodular pyrite, loose, good porosity, mineral fluorescence only.
	20		<u>SILTSTONE</u> : Medium to dark brown, medium grey, very argillaceous, micromicaceous, trace lithics, soft to firm, slightly dispersive in part, massive to blocky.
	Trace		<u>CLAYSTONE</u> : As above.
3050	100		<u>SANDSTONE</u> : Predominantly as above, common nodular pyrite & pyrite cement.
	Trace		<u>CLAYSTONE</u> : As above.

3055	100	<u>SANDSTONE</u> : Predominantly as above, locally common very coarse smoky quartz.
3060	90	<u>SANDSTONE</u> : Clear to translucent, frosted, medium to predominantly coarse to very coarse, angular to subrounded, poor sorting, trace siliceous cement, trace kaolinitic matrix, common very coarse milky quartz, trace glauconite, trace pyritic cement & nodules, loose, good porosity, mineral fluorescence only.
	10	<u>CLAYSTONE</u> : Pale grey, light to medium grey, occasionally brown grey, slightly silty in part, micromicaceous, trace biotite, soft to firm, massive.
3065	100 Trace	<u>SANDSTONE</u> : As above. <u>CLAYSTONE</u> : As above.
3070	80	<u>SANDSTONE</u> : Clear to translucent, frosted, medium to very coarse, subangular to subrounded, poor sorting, trace kaolinitic matrix, trace pelletoidal glauconite, trace very coarse milky/smoky quartz, rare red garnet, loose, good porosity, no fluorescence.
	20	<u>SILTSTONE</u> : Medium grey, brown grey, very argillaceous grades to claystone in part, micromicaceous, trace lithic fragments, trace carbonaceous specks, soft to firm, massive.
3075	60	<u>SANDSTONE</u> : Predominantly as above common kaolinitic matrix, trace nodular pyrite.
	40	<u>SILTSTONE</u> : Predominantly as above, becomes brown grey to dark olive grey, grades to claystone in part.
3080	40	<u>SANDSTONE</u> : Predominantly as above, occasionally light to medium grey, fine grained friable aggregates with abundant argillaceous matrix.
	60	<u>SILTSTONE</u> : As above.
3085	30	<u>SANDSTONE</u> : Light grey, occasionally clear to translucent, fine to medium,



		subangular to subrounded, moderate sorting, abundant light grey argillaceous matrix, trace kaolinitic matrix, trace coarse milky quartz float, trace lithic fragments, rare glauconite, friable to lose, poor to fair porosity, no fluorescence.
	70	<u>SILTSTONE</u> : Medium grey, brown grey to dark olive grey, very argillaceous locally grades to claystone, trace lithic fragments, micromicaceous, trace carbonaceous specks, soft to firm, massive.
3090	30	<u>SANDSTONE</u> : As above.
	70	<u>SILTSTONE</u> : As above.
3095	70	<u>SANDSTONE</u> : Clear to translucent, frosted, medium to predominantly coarse to very coarse, subangular to subrounded, poor sorting, clean, common coarse to very coarse milky quartz float, trace pelletoidal glauconite, trace carbonaceous fragments, loose, good porosity, no fluorescence.
	30	<u>CLAYSTONE</u> : Predominantly as above, trace carbonaceous microlaminae.
3100	80	<u>SANDSTONE</u> : Predominantly as above, fine to coarse, poor sorting, trace glauconite.
	20	<u>SILTSTONE</u> : Predominantly as above, occasionally slightly arenaceous, glauconitic in part.
3105	80	<u>SANDSTONE</u> : Clear to translucent, frosted, fine to predominantly medium to coarse, poor to moderate sorting, locally common kaolinitic matrix, trace nodular pyrite, common very coarse milky quartz float, trace pelletoidal glauconite, trace carbonaceous fragments, loose, fair to good porosity, no fluorescence.
	20	<u>SILTSTONE</u> : Light to medium grey, brown grey to dark olive grey, very argillaceous locally grades to claystone, trace carbonaceous specks, trace lithic

		fragments, trace fine quartz sand, glauconitic in part, soft to firm, massive.
3110	100	<u>SANDSTONE</u> : Predominantly as above, common kaolinitic matrix, trace nodular pyrite in part.
	Trace	<u>SILTSTONE</u> : As above.
3115	90	<u>SANDSTONE</u> : Clear to translucent, frosted, fine to coarse, subangular to subrounded, poor sorting, trace pyritic cement, trace to common kaolinitic matrix & inclusions, common very coarse, milky quartz, trace nodular pyrite, trace pelletoidal glauconite, loose, good porosity, no porosity.
	10	<u>SILTSTONE</u> : As above.
3120	100	<u>SANDSTONE</u> : Predominantly as above, becomes medium to coarse, abundant kaolinitic matrix.
	Trace	<u>SILTSTONE</u> : As above.
3125	100	<u>SANDSTONE</u> : Clear to translucent, frosted, medium to coarse, angular to subrounded, moderate sorting, trace pyritic cement, trace to moderate kaolinitic matrix in part, predominantly clean, trace smoky/milky quartz, loose, good porosity, no fluorescence.
	Trace	<u>SILTSTONE</u> : As above.
3130	70	<u>SANDSTONE</u> : Predominantly as above, becomes medium to coarse, poor sorting, common kaolinitic matrix.
	30	<u>SILTSTONE</u> : Light to medium grey, brown grey, very argillaceous grades to claystone in part, slightly siliceous in part, trace disseminated and elongated pyrite, slightly micromicaceous, soft to firm, massive, blocky.
3135	70	<u>SANDSTONE</u> : Predominantly as above, becomes fine to medium, common kaolinitic matrix, occasionally coarse quartz float.
	30	<u>SILTSTONE</u> : As above.
3140	90	<u>SANDSTONE</u> : Clear to translucent,

			frosted, light grey, fine to predominantly medium to coarse, angular to subrounded, moderate sorting, occasionally strong siliceous cement, strong calcareous/dolomitic cement, common kaolinitic matrix in part, common very coarse milky quartz float, trace pyritic cement & nodules, trace quartz overgrowths in part, poor to fair porosity, dull gold mineral fluorescence only.
		10	<u>SILTSTONE</u> : Light to medium grey, brown grey, locally very argillaceous grades to claystone in part, micromicaeous in part, trace disseminated pyrite, occasionally very fine quartz sand, soft to firm, massive to blocky.
3145		100	<u>SANDSTONE</u> : Predominantly as above, becomes medium to coarse.
		Trace	<u>SILTSTONE</u> : As above.
3150		70	<u>SANDSTONE</u> : Clear to translucent, frosted, light grey, fine to coarse, angular to subrounded, poor sorting, common kaolinitic matrix, trace nodular pyrite, trace carbonaceous fragments, trace biotite, common very coarse milky/smoky quartz, loose, fair to good porosity, trace dull gold mineral fluorescence only.
		30	<u>SILTSTONE</u> : As above.
3155		100	<u>SANDSTONE</u> : Predominantly as above, becomes medium to coarse, moderate to good sorting, clean, good porosity, mineral fluorescence only.
3160		100	<u>SANDSTONE</u> : Clear to translucent, frosted, light grey, fine to predominantly medium to coarse, subangular to subrounded, moderate sorting, trace calcareous/dolomitic cement, trace to common kaolinitic matrix, trace nodular pyrite, trace glauconite, common very coarse milky/smoky quartz float, trace kaolinite inclusions, loose, good porosity, mineral fluorescence only.

	Trace	<u>SILTSTONE</u> : Predominantly as above, slightly arenaceous in part.
3165	100	<u>SANDSTONE</u> : As above.
	Trace	<u>SILTSTONE</u> : As above.
3170	30	<u>SANDSTONE</u> : Predominantly as above, common kaolinitic matrix, common very coarse milky quartz, poor porosity, no fluorescence.
	70	<u>SILTSTONE</u> : Medium to medium dark grey, very argillaceous, arenaceous in part grades to silty sandstone, trace carbonaceous specks, micromicaceous, trace lithic fragments, soft to slightly dispersive, massive to amorphous.
3175	80	<u>SANDSTONE</u> : Predominantly as above, becomes medium to coarse, clean, good porosity, no fluorescence.
	20	<u>SILTSTONE</u> : As above.
3180	60	<u>SANDSTONE</u> : Clear to translucent, light grey, frosted, fine to predominantly medium to coarse, angular to subrounded, poor sorting, clean, trace carbonaceous specks, common coarse milky/smoky quartz, loose, fair to good porosity, no fluorescence.
	35	<u>SILTSTONE</u> : Medium grey to medium dark grey, dark brown grey, very argillaceous locally grades to claystone, slightly arenaceous in part, trace lithic/carbonaceous fragments, micromicaceous, soft to slightly dispersive, massive to amorphous.
	5	<u>CLAYSTONE</u> : Brown grey to dark grey, slightly micromicaceous, smooth, homogeneous, waxy texture, plastic, blocky to massive.
3185	60	<u>SANDSTONE</u> : Predominantly as above, trace kaolinitic matrix.
	40	<u>SILTSTONE</u> : As above.
	Trace	<u>CLAYSTONE</u> : As above.
3190	30	<u>SANDSTONE</u> : Clear to translucent, light grey, fine to medium, subangular to subrounded, moderate to good

			sorting, trace pyritic cement, trace kaolinitic matrix, trace coarse milky quartz float, trace carbonaceous fragments, loose, fair to odd porosity, no fluorescence.
		70	<u>SILTSTONE</u> : Light to medium grey, light brown grey, very argillaceous grades to claystone in part, arenaceous in part, trace biotite, micromicaceous, trace carbonaceous fragments, soft to plastic, slightly dispersive, massive.
3195		80	<u>SANDSTONE</u> : Clear to translucent, light grey, medium to coarse, subangular to subrounded, moderate sorting, trace kaolinitic matrix, common light grey argillaceous matrix, trace biotite, trace carbonaceous fragments, common milky/smoky quartz float, loose, fair to poor porosity, no fluorescence.
		20	<u>SILTSTONE</u> : As above.
3200		40	<u>SANDSTONE</u> : Predominantly as above, becomes fine to coarse, poor sorting.
		60	<u>SILTSTONE</u> : As above.
		Trace	<u>CLAYSTONE</u> : Medium to dark grey, slightly micromicaceous, smooth, waxy texture, plastic, blocky.
3205		70	<u>SANDSTONE</u> : As above.
		10	<u>SILTSTONE</u> : As above.
		20	<u>CLAYSTONE</u> : As above.
3210		70	<u>SANDSTONE</u> : Clear to translucent, light grey, fine to medium, subangular to subrounded, rounded in part, trace light grey argillaceous matrix, trace kaolinitic matrix, trace biotite, trace lithic fragments, trace coaly fragments, trace coarse milky quartz float, loose, occasionally friable aggregates, poor to fair porosity, no fluorescence.
		20	<u>SILTSTONE</u> : As above.
		10	<u>CLAYSTONE</u> : As above.
3215		80	<u>SANDSTONE</u> : Predominantly as above, becomes fine grained.

	20	<u>SILTSTONE</u> : Predominantly as above, becomes very arenaceous in part, grades to fine grained sandy siltstone.
	Trace	<u>CLAYSTONE</u> : A above.
3220	60	<u>SANDSTONE</u> : Predominantly as above, becomes medium to coarse, poor sorting, common argillaceous matrix.
	40	<u>SILTSTONE</u> : As above.
3225	30	<u>SANDSTONE</u> : Light grey, off white, occasionally clear to translucent, medium to coarse, subangular to subrounded, moderate sorting, common light grey argillaceous matrix, trace kaolinitic matrix, trace glauconite, trace carbonaceous specks, trace coarse milky quartz, loose, poor porosity, no fluorescence.
	70	<u>SILTSTONE</u> : Light grey, medium grey, light brown grey, very argillaceous, micromicaceous, trace carbonaceous specks, soft to slightly dispersive, massive to amorphous.
3230	70	<u>SANDSTONE</u> : Predominantly as above, clear to translucent, medium to coarse, trace pyritic cement, trace pelletoidal glauconite.
	30	<u>SILTSTONE</u> : Predominantly as above, trace biotite trace disseminated pyrite.
3235	100	<u>SANDSTONE</u> : Clear to translucent, frosted, fine to medium, subangular to subrounded, good sorting, clean, trace kaolinitic inclusions, trace coaly fragments, trace glauconite/chlorite, trace medium to coarse milky quartz, loose, good porosity, no fluorescence.
3240	90	<u>SANDSTONE</u> : Predominantly as above, becomes medium to coarse, moderate sorting.
	10	<u>SILTSTONE</u> : Light to medium grey, light brown grey, very argillaceous grades to claystone in part, slightly micromicaceous, trace carbonaceous specks, trace disseminated pyrite, slightly arenaceous in part, soft, massive to amorphous.

3245

60

SANDSTONE: Predominantly as above, becomes medium to coarse, locally trace kaolinitic matrix, common very coarse to granular milky quartz float.

40

SILTSTONE: As above.

3250(TD)

70

SANDSTONE: As above.

30

SILTSTONE: As above.

# APPENDIX 2



5th Cut  
A4 Dividers  
Re-order Code 97052



**APPENDIX II**

***SIDEWALL CORE DESCRIPTIONS***

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SIDEWALL CORE DESCRIPTIONS

<u>No.</u>	<u>Depth</u> (m)	<u>Rec.</u> (mm)	<u>B/R</u>	<u>Description</u>
1	3207			Lost
2	3177	20	B	<u>SANDSTONE</u> : Light grey, fine, subangular to subrounded, good sorting, common silty/argillaceous matrix, trace pyritic cement, trace rock fragments, common argillaceous laminae, friable, poor porosity, no fluorescence.
3	3145			Misfire
4	3143	15	B	<u>SANDSTONE</u> : Off white to light grey, fine to medium, subangular to subrounded, moderate sorting, abundant kaolinitic/silty matrix, trace pyritic cement, trace rock fragments, friable, tight, no fluorescence.
5	3147			Empty
6	3128	20	B	<u>SANDSTONE</u> : Off white, light grey, fine to medium, subangular to subrounded, moderate sorting, abundant kaolinitic/silty matrix, trace rock fragments, trace smoky quartz, friable, tight, no fluorescence.
7	3076	20	B	<u>SANDSTONE</u> : Light to medium grey, light brown grey, fine to medium, subangular to subrounded, moderate sorting, common argillaceous/silty matrix, trace very coarse milky quartz float, trace olive grey argillaceous inclusions, trace rock fragments, friable, poor porosity, no fluorescence.
8	3008	25	B	<u>SANDSTONE</u> : Light brown grey to medium grey, fine to medium, subangular to subrounded, moderate sorting, abundant argillaceous/silty matrix, trace pyritic cement, trace biotite, trace carbonaceous flecks, friable, very poor to nil porosity, no fluorescence.

- |    |        |    |   |
|----|--------|----|---|
| 9  | 2962   | 25 | B <u>SANDSTONE</u> : White, pale grey, medium to coarse, subangular to subrounded, moderate sorting, common kaolinitic/silty matrix, common weathered mica, trace pyritic cement in part, trace rock fragments, friable, poor to fair porosity, no fluorescence.  |
| 10 | 2961   | 15 | B <u>SANDSTONE</u> : off white, light grey, medium to very coarse, angular to subrounded, poor sorting, weak siliceous cement, abundant very coarse to granular subrounded milky quartz float, trace biotite, trace rock fragments, trace nodular pyrite, friable to moderately hard, good porosity, no fluorescence. |
| 11 | 2960   | 25 | B <u>SANDSTONE</u> : Light grey, light brown grey, fine to medium, subangular to subrounded, good sorting, weak siliceous cement, trace biotite, common disseminated pyrite & pyritic cement, trace rock fragments, friable, poor to fair porosity, no fluorescence.  |
| 12 | 2959.5 | 30 | B <u>SANDSTONE</u> : Light grey, , clear to translucent, fine to predominantly medium, angular to subrounded, moderate to good sorting, weak siliceous cement, trace rock fragments, rare glauconite, friable, fair to good porosity, no fluorescence.  |
| 13 | 2944   | 20 | B <u>SANDSTONE</u> : Light grey, fine to occasionally medium, subangular to subrounded, good sorting, slightly argillaceous/silty matrix, trace medium to coarse milky/smoky quartz, friable, fair porosity, no fluorescence.   |
| 14 | 2929   | 20 | B <u>SANDSTONE</u> : Light grey, light to medium grey, fine to medium, subangular to subrounded, moderate sorting, weak siliceous cement, slightly argillaceous matrix, trace medium to coarse smoky quartz float, trace biotite, trace rock fragments, friable to very friable, good porosity, no fluorescence.      |
| 15 | 2922   | 20 | B <u>SANDSTONE</u> : Predominantly as above, trace carbonaceous fragments.  |

16	2929	25	B <u>SANDSTONE</u> : Light to medium grey, fine to predominantly medium, subangular to subrounded, moderate to good sorting, weak siliceous cement, trace silty matrix, trace coarse milky/smoky quartz, common rock fragments, very friable, good porosity, no fluorescence.
17	2916	10	B <u>SANDSTONE</u> : Medium grey, coarse to very coarse, angular to subrounded, poor to moderate sorting, trace siliceous & pyritic cement, common kaolinitic matrix, common very coarse milky/smoky quartz, trace olive grey argillaceous inclusions, moderately hard, tight, no fluorescence.
18	2914	20	B <u>SILTSTONE</u> : Dark green grey, very argillaceous, abundant glauconite, common very coarse feldspar float, trace coarse milky quartz, firm to plastic, massive.
19	2913	25	B <u>LITHIC GREYWACKE</u> : Dark green grey, moderately silty, abundant glauconite (80%), trace lithic fragments, trace nodular pyrite, moderately hard, massive.
20	2910	20	B <u>LITHIC GREYWACKE</u> : As above.
21	2908	20	B <u>LITHIC GREYWACKE</u> : Predominantly as above, common medium grained quartz float.
22	2906	25	B <u>LITHIC GREYWACKE</u> : Dark green grey, dark grey, fine grained, silty/argillaceous matrix, common glauconite, trace pelletoidal glauconite, firm to moderately hard, massive.
23	2904	20	B <u>SILTSTONE</u> : Dark grey, brown black, slightly arenaceous, very argillaceous, common glauconite, trace disseminated pyrite, moderately hard, massive.
24	2899	20	B <u>CALCAREOUS CLAYSTONE</u> : Light to medium grey, becomes very calcareous grades to calcilutite, micromicaceous, trace fine to medium quartz sand, smooth, waxy, plastic, massive to subfissile.

25 2894 40

B SILTSTONE: Dark brown, brown black, very argillaceous, common pelletoidal glauconite, trace nodular pyrite, slightly arenaceous, trace lithic fragments, moderately hard, massive.

26 2888 30

B LIMESTONE: Light grey, off white, calcilutite grades to calcisiltite, very argillaceous, trace glauconite, trace disseminated pyrite, firm, massive, blocky.

# APPENDIX 3

Appendix 3



5th Cut  
A4 Dividers  
Re-order Code 97052

**APPENDIX III**

**CHECKSHOT SURVEY**



PE600634

This is an enclosure indicator page.  
The enclosure PE600634 is enclosed within the  
container PE900819 at this location in this  
document.

The enclosure PE600634 has the following characteristics:

ITEM\_BARCODE = PE600634  
CONTAINER\_BARCODE = PE900819  
NAME = Checkshot Survey  
BASIN = GIPPSLAND  
PERMIT =  
TYPE = WELL  
SUBTYPE = VELOCITY\_CHART  
DESCRIPTION = Checkshot Survey Billfish-1  
REMARKS =  
DATE\_CREATED = 06/02/1997  
DATE\_RECEIVED = 06/08/1997  
W\_NO = W1178  
WELL\_NAME = Billfish-1  
CONTRACTOR = Schlumberger  
CLIENT\_OP\_CO = Esso

(Inserted by DNRE - Vic Govt Mines Dept)



# APPENDIX 4

Appendix 4



5th Cut  
A4 Dividers  
Re-order Code 97052

**APPENDIX IV**

***DEVIATION SUMMARY***

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**ECI DRILLING ORGANIZATION  
DEVIATION SUMMARY**

PAGE: 1

<b>WELL NAME:</b> BILLFISH-1	<b>EVENT:</b> DRL	<b>DATE:</b> 02/10/97
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GENERAL INFORMATION			
WELLBORE SECTION	OH	KICK OFF DATE	
DEPTH (m)	3,250.00	AFE NUMBER	L70016000
RIG NAME:	SEDCO 703	SPUD DATE	
DRILLING CONTRACTOR	SEDCO	RIG RELEASE DATE	
CALCULATION METHOD	Minimum Curvature	SECTION PLANE	0.00
CLOSURE DISTANCE (m)	31.44	CLOSURE DIRECTION	322.85

DEVIATION SUMMARY										
DEPTH (m KB)	TIE IN	ANGLE	AZIMUTH	T.V.D. (m KB)	N/S (-) (m)	E/W (-) (m)	SECTION (m)	DLS (°/30)	BUR (°/30)	TYPE
0.00	Y	0.000		0.00	0.00	0.00	0.00	0.00	0.00	
560.00		1.750	0.00	559.91	8.55	0.00	8.55	0.09	0.09	MS
1,048.00		0.500	250.00	1,047.84	15.27	-2.00	15.27	0.12	-0.08	MS
1,312.00		0.500	270.00	1,311.83	14.88	-4.23	14.88	0.02	0.00	MS
1,340.70		0.800	258.60	1,340.53	14.84	-4.55	14.84	0.34	0.31	MD
1,370.20		1.200	256.30	1,370.03	14.73	-5.05	14.73	0.41	0.41	MD
1,399.30		1.100	251.80	1,399.12	14.57	-5.61	14.57	0.14	-0.10	MD
1,428.30		1.000	261.20	1,428.12	14.44	-6.12	14.44	0.21	-0.10	MD
1,457.60		1.000	264.30	1,457.42	14.38	-6.63	14.38	0.06	0.00	MD
1,485.60		1.000	262.30	1,485.42	14.32	-7.12	14.32	0.04	0.00	MD
1,515.50		1.100	258.90	1,515.31	14.23	-7.66	14.23	0.12	0.10	MD
1,544.10		1.100	260.80	1,543.90	14.13	-8.20	14.13	0.04	0.00	MD
1,600.10		1.200	240.30	1,599.89	13.75	-9.24	13.75	0.23	0.05	MD
1,629.20		1.000	270.80	1,628.98	13.60	-9.76	13.60	0.63	-0.21	MD
1,658.30		1.000	15.20	1,658.08	13.85	-9.95	13.85	1.63	0.00	MD
1,684.50		1.100	271.60	1,684.28	14.08	-10.14	14.08	1.89	0.11	MD
1,745.20		1.300	312.50	1,744.97	14.56	-11.23	14.56	0.42	0.10	MD
1,914.70		1.000	285.00	1,914.44	16.24	-14.08	16.24	0.11	-0.05	MS
2,207.70		0.800	31.40	2,207.42	18.65	-15.48	18.65	0.15	-0.02	MD
2,264.00		0.900	325.20	2,263.72	19.35	-15.53	19.35	0.50	0.05	MD
2,322.50		0.700	325.70	2,322.21	20.02	-15.99	20.02	0.10	-0.10	MD
2,377.30		0.700	309.50	2,377.01	20.51	-16.44	20.51	0.11	0.00	MD
2,435.50		0.500	303.90	2,435.21	20.88	-16.93	20.88	0.11	-0.10	MD
2,522.90		0.400	312.70	2,522.61	21.30	-17.47	21.30	0.04	-0.03	MD

ECI DRILLING ORGANIZATION  
DEVIATION SUMMARY

PAGE: 2

<b>WELL NAME: BILLFISH-1</b>	<b>EVENT: DRL</b>	<b>DATE: 02/10/97</b>
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DEVIATION SUMMARY										
DEPTH (m KB)	TIE IN	ANGLE	AZIMUTH (°)	T.V.D. (m KB)	N/S (-) (m)	E/W (-) (m)	SECTION (m)	DLS (°/30)	BUR (°/30)	TYPE
2,551.00		0.500	283.60	2,550.71	21.40	-17.66	21.40	0.26	0.11	MD
2,580.10		0.500	311.90	2,579.81	21.51	-17.88	21.51	0.25	0.00	MD
2,609.20		0.400	306.70	2,608.91	21.66	-18.06	21.66	0.11	-0.10	MD
2,667.00		0.500	321.30	2,666.71	21.98	-18.38	21.98	0.08	0.05	MD
2,696.30		0.500	333.80	2,696.01	22.19	-18.52	22.19	0.11	0.00	MD
2,725.70		0.500	333.50	2,725.41	22.42	-18.63	22.42	0.00	0.00	MD
2,754.70		0.500	314.00	2,754.41	22.62	-18.78	22.62	0.18	0.00	MD
2,783.50		0.500	343.90	2,783.21	22.83	-18.91	22.83	0.27	0.00	MD
2,812.50		0.500	343.20	2,812.21	23.07	-18.98	23.07	0.01	0.00	MD
2,870.00		0.400	338.60	2,869.71	23.50	-19.13	23.50	0.06	-0.05	MD
2,897.20		0.500	332.30	2,896.91	23.69	-19.22	23.69	0.12	0.11	MD
2,926.00		0.500	349.40	2,925.71	23.92	-19.30	23.92	0.15	0.00	MD
2,941.40		0.500	337.70	2,941.11	24.05	-19.34	24.05	0.20	0.00	MD
3,012.70		0.800	349.80	3,012.41	24.83	-19.55	24.83	0.14	0.13	MD
3,041.80		0.500	10.50	3,041.51	25.15	-19.56	25.15	0.39	-0.31	MD
3,051.50		0.500	353.10	3,051.21	25.23	-19.56	25.23	0.47	0.00	MD
3,070.40		0.400	5.30	3,070.11	25.38	-19.56	25.38	0.22	-0.16	MD
3,098.10		0.200	258.40	3,097.81	25.47	-19.60	25.47	0.54	-0.22	MD
3,155.60		0.500	104.90	3,155.31	25.39	-19.46	25.39	0.36	0.16	MD
3,212.80		0.400	135.90	3,212.51	25.18	-19.08	25.18	0.14	-0.05	MD
3,237.20		0.300	148.70	3,236.91	25.06	-18.99	25.06	0.16	-0.12	MD

# APPENDIX 5



5th Cut  
A4 Dividers  
Re-order Code 97052

*APPENDIX V*

*MUDLOG*

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PE603732

This is an enclosure indicator page.  
The enclosure PE603732 is enclosed within the  
container PE900819 at this location in this  
document.

The enclosure PE603732 has the following characteristics:

ITEM\_BARCODE = PE603732  
CONTAINER\_BARCODE = PE900819  
    NAME = Billfish 1 Masterlog (Mud Log)  
    BASIN = GIPPSLAND  
    PERMIT = VIC/P34  
    TYPE = WELL  
    SUBTYPE = MUD\_LOG  
DESCRIPTION = Billfish 1 Masterlog (Mudlog)  
REMARKS =  
DATE\_CREATED = 5/02/97  
DATE\_RECEIVED = 16/04/97  
    W\_NO = W1178  
    WELL\_NAME = Billfish-1  
CONTRACTOR = Geoservices Logging  
CLIENT\_OP\_CO = Esso Australia Ltd.

(Inserted by DNRE - Vic Govt Mines Dept)