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# WELL COMPLETION REPORT LEATHER JACKET-1 VOLUME I W 928 BASIC DATA 13 AUG 1986 PETROLEUM DIVISION

GIPPSLAND BASIN VICTORIA

**ESSO AUSTRALIA LIMITED** 

Compiled by: M.E.FITTALL

JULY, 1986

#### LEATHERJACKET-1

#### WELL COMPLETION REPORT

## VOLUME 1

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2307L/47

GEOGRAM PROCESSING REPORT. 1

#### ESSO AUSTRALIA LTD

#### COMPLETION REPORT

1. WELL DATA

WELL : LEATHERJACKET-1

LOCATION : Latitude : 38° 05' 16.86"S

Longitude : 148° 46' 41.83"E

X = 655 949m EY = 5 782 912m N

Map Projection: UTM, ANS/AGD AMG ZONE 55

Geographical Location: Bass Strait

Field: Leatherjacket

PERMIT : VIC/P19

ELEVATION : 21mKB

WATER DEPTH : 106m

TOTAL DEPTH : 951.0mKB, 930mSS

PLUG BACK TYPE : Balanced Plug

REASONS FOR

PLUGGING BACK : Plug & abandonment

MOVE IN : 22nd February, 1986

SPUDDED : 23rd February, 1986

REACHED T.D. : 27th February, 1986

RIG RELEASED : 4th March, 1986.

OPERATOR : Esso Exploration and Production Aust. Inc.

PERMITTEE OR LICENCEE : Shell Development (Australia) Pty Ltd

The News Corporation Ltd; TNT Management Pty. Ltd; Crusader (Victoria) Pty. Ltd.; Mincorp

Offshore Pty. Ltd.

ESSO INTEREST : 25%

OTHER INTEREST : 25% BHP Petroleum (Australia) Pty Ltd.

20% Shell Development (Australia) Pty Ltd.

10% The News Corporation Ltd.
10% TNT Management Pty Ltd.
7.5% Crusader (Victoria) Pty Ltd.

2.5% Mincorp Offshore Pty Ltd.

CONTRACTOR : South Seas Drilling Company

RIG NAME : Southern Cross

EQUIPMENT TYPE : Oilwell E-2000 Semi-Submersible

TOTAL RIG DAYS : 10

DRILLING AFE NO. : 236175

TYPE COMPLETION : Plug and abandoned.

WELL CLASSIFICATION : Before Drilling New Field Wildcat

After Drilling New Field Oil Discovery

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#### LEATHERJACKET-1

#### Moving/Mooring

Under tow by the Lady Sally, the Southern Cross departed the Whiting-1 Wellhead Recovery location at 1700 hours February 21, 1986 and arrived at the Leatherjacket-1 location at 0715 hours February 22, 1986. The 44 nautical mile tow was completed in 14.25 hours at an average speed of 3 knots. Anchor No. 8 was dropped by the rig on approach to the location. The remaining seven anchors were run by the Swan Tide and Lady Sally. All anchors were run in 9.75 hours and pretensioned to 200 kips.

The final rig location was:

Latitude : 38° 05' 16.86" S Longitude : 148° 46' 41.83" E X = 655,949m E Y = 5,782,912m N

AMG Zone 55, Universal Transverse Mercator Projection, Australian Geodetic Datum.

The rig was located 1.73m at  $342^{\circ}$  from the called location and approximately 79 km at  $105^{\circ}$  from Lakes Entrance, Victoria.

#### Drill 26" Hole for 20" Casing

The drilling template was run and landed at a seafloor depth of 127m. The 26 hole was drilled to 267m using seawater and high viscosity gel slugs to clean the hole. A wiper trip was made to the seafloor and the hole was displaced with 300 bbls of high viscosity gel mud.

While pulling out of the hole at 158m, a 100 bbl high viscosity pull was spotted to fill the hole displaced by the drillstring. The 20" casing was run and cemented with the casing shoe at 253m. The BOP stack was run and the collet connector and casing were tested to 500 psi against the shear rams.

#### Drill 17-1/2" Hole for 13-3/8" Casing

The cement and 20" casing shoe were drilled and the 17-1/2" hole drilled to 641m using a seawater/gel mud system. A wiper trip was made to the 20" casing shoe and the hole circulated clean. No logs were run before the 13-3/8" casing was run and cemented at 626m. The wellhead was washed and the seal assembly was set and tested along with the BOP stack.

Normally, the 17-1/2" hole would have been drilled to approximately 850m and the 13-3/8" casing set at 835m. The hole and casing depths were shortened because surface casing needed to be set before the Top of Latrobe (predicted at 724m) was penetrated. The casing cement was designed to have its top 70m below the 20" casing shoe.

#### Drill 12-1/4" Hole to 951m

The float collar and cement were drilled out to 618m before the casing was tested to 1500 psi. The remaining cement and float shoe were drilled and the mud weight increased to 11.0 ppg. This increase was programmed to provide a 200 psi overbalance at the Top Latrobe if the predicted 72m of closure was gas filled. Six metres of new hole were drilled and a Phase II PIT was run to leak off at 450 psi, indicating an integrity of 15.2 ppg EMW at the 13-3/8" casing shoe.

5/

The 12-1/4" hole was drilled to the programmed TD of 951m. One core was cut at 787m with a recovery of 83.5%. The mud weight was slowly dropped from 11.0 ppg to 10.5 ppg since the objective was not completely gas filled or as thick as anticipated.

Logs and RFT's were run at TD along with CST's and WST's. Malfunctions with Schlumberger's logging tools contributed to 9 hours of non-productive time. The hydrocarbon bearing sands at 764m to 788.5m and 811m to 820m were found washed out to as much as 19 inches.

#### Plug and Abandonment

A cement diverter tool run on 5" drill set Plug No. 1 from 875m to 686m, covering the hydrocarbon bearing sands. The plug was tagged with 15 kips. Plug No. 2 was set across the 13-3/8" casing shoe from 675m to 575m. The plug was pressure tested to 1500 psi. A 13-3/8" bridge plug was set high at 451m after the gauge ring/junk basket run was stopped by an obstruction at 462m. The 13-3/8 casing was severed with a Pengo cutter at 233m and retrieved with a spear.

The surface plug, Plug No. 3, was set across the 13-3/8" casing stub from 265m to 165m using a cement diverting tool on drillpipe. The plug was tested to 500 psi before the BOP was pulled. A 3.9 kg explosive charge was run on drillpipe below the wellhead running tool and severed the 20" casing at 138m. The pile joint assembly and four post guidebase were retrieved with the running tool. While pulling the 4 poster, the mousetrap slings parted on three guidelines while the remaining sling failed to engage with its mousetrap. With diver assistance, the drilling template was retrieved by using slings and chains attached to inverted elevators in drillpipe.

#### Pull Anchors

All anchors were recovered in 7.25 hours by the workboats Lady Sally and Torrens Tide. The rig departed the Leatherjacket-1 location at 1345 hours March 4, 1986 under tow by the Lady Sally to the Kipper-1 location.

CSG O.D. in.	CSG WT. ppf	CSG GRADE	CSG CONN.	CSG LGTH mtrs.	CENTRALIZER POSITION.	SHOE DPTH mRKB	REMARKS
20	94	X-52	JV	13.12		253	Float Shoe Jnt
20	94	X-52	J۷	91.58	Across Collars on First Five Jnts		7 Jnts
20	129	K-55	JA\CC	13.52			Crossover Jnt
24	670		CC	10.97			Wellhead No. EP9-1-2-3-4
13-3/8	54.5	K-55	Butt.	12.33		626	Float Shoe Jnt
13-3/8	54.5	K-55	Butt.	12.55	•	601	Float Collar Jnt
13-3/8	54.5	K-55	Butt.	473.94	Across Collars on First Six Jnts		39 Jnts
13-3/8			Butt.	0.72			Hanger No. EHW31-1. Seal Assy No. ESW33-1.

CEMENT JOB Type	CEMENT TOP mRKB	CEMENT BTM mRKB	CEMENT ADDITIVES	CEMENT VOLUME sxs	CEMENT WEIGHT PPg	REMARKS
20" Csg.	127	178	2.2% gel w/ 182bbls Seawater	750	12.5	Lead slurry.
20" Csg.	178	253	42bbls Seawater	350	15.8	Tail slurry.
13-3/8" Csg.	323	626	79bbls Seawater	665	15.8	Displace with 241bbls mud. Bump plug w/1500psi.
P&A Plug No. 1	686	875	69bbls Seawater	580	15.8	Tagged w/ 15 kips.
P&A Plug No. 2	575	675	36bbls Seawater	300	15.8	Pressure tested to 1500 psi.
P&A Plug No. 3	165	265	56bbls Seawater	470	15.8	Pressure tested to 500psi.

WELL: LEATHERJACKET-1

5. SAMPLES, CONVENTIONAL CORES, SIDEWALL CORES

<u>INTERVAL</u> <u>TYPE</u>

#### CUTTING SAMPLES

253.0m-951.0m 3 sets of washed and oven dried cuttings and 1 set of lightly washed and bagged cuttings as follows:
10m intervals - 253.0 to 640.0m
5m intervals - 640.0 to 951.0m

253.0m-951.0m <u>GEOCHEMICAL SAMPLES</u>
1 set of unwashed canned samples every 15m.

787.0m-796.1m PVC SLEEVE CORE NO. 1. Cut 9.0m, recovered 83.5%.

933.6m-742.0m SIDEWALL CORES (ONE RUN) Shot 30, recovered 29.

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WELL: LEATHERJACKET-1

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#### WIRELINE LOGS AND SURVEYS

Type and Scal	<u>e</u>		From	<u>To</u>				
No tophole BHC-GR run on Leatherjacket-1								
	<u>5</u>	Suite 1						
DLTE-MSFL-GR-SP-CAL	1:200 ) 1:500 )	Multi*	948.0	625.Om				
LDTD-CNTH-SP-GR-CAL (GR only to surface)	1:200 ) 1:500 )	Combination	948.0	700.0m				
SDT-GR	1:200 ) 1:500 )		925.0	625.Om				
RFT-GR/HP (RUNS 1-3) 24 seats, 3 samples			846.8	757.5m				
HDT-GR	1:200		952.5	625.Om				
WST-GR (5 levels)			951.0	620.Om				
CST-GR (1 run) Shot 30, Recovered 29			933.6	742.Om				

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<sup>\*</sup> owing to technical difficulties, the full multi-combination tool could not be run in one pass.

							,		TT-PACKARD	***************************************	TT-PACKARD	100
				RECOVER	RY (LITR			FORMAT	ION PRESSURE	HYDROST	ATIC PRESSI	<u>JRE</u>
TEST & SEAT NO.	DEPTH (METRES)	CHAMBER	OIL	COND.	GAS	FORMATION WATER	MUD FILTRATE	<u>MPaa</u>	<u>Psia</u>	MPaa	<u>Psia</u>	REMARKS
	К.В.	Litres	Litres	Litres	m <sup>3</sup>	Litres	Litres					
1/1	846.8	Pretest						8.51	1233.86	10.53	1526.6	Good test. Very high perm.
1/2	824.0	Pretest						-	-	10.27	1489.0	Very tight. Aborted.
1/3	823.0	Pretest						_	-	10.25	1487.0	Very tight. Aborted.
1/4	822.0	Pretest						-	_	10.25	1486.0	Very tight. Aborted.
1/5	821.0	Pretest						-		10.23	1484.0	Very tight. Aborted.
1/6	838.0	Pretest						-	-	10.44	1514.0	Very tight. Aborted.
1/7	818.0	Pretest						-	-	10.20	1479.0	Loss of Seal
1/8	818.2	Pretest	•						_	10.20	1479.56	Very tight. Aborted.
1/9	817.3	Pretest						-	-	10.19	1477.88	Loss of Seal. Aborted.
1/10	817.3	Pretest							-	10.19	1478.49	Loss of Seal. Aborted.
1/11	813.0	Pretest						-	-	10.14	1470.61	Extremely tight.
1/12	804.0	Pretest						8.07	1170.90	10.03	1455.38	"Sticky" Good test.
1/13	793.7	Pretest	•					7.97	1155.85	9.90	1435.86	Good test.
1/14	789.8	Pretest						7.93	1150.29	9.86	1429.50	Good test. Good perm.
1/15	788.5	Pretest						_	-	9.83	1425.63	Invalid test. RESET.
1/16	788.5	45.4 10.4 (	0.5 Not one	- ened)	0.004	8.0	-	7.92	1148.06	9.82	1424.63	Very tight. (sample) Aborted.
1/17	770.5	Pretest						-	_	9.60	1392.48	Lost seal. Aborted.
1/18	770.5	Pretest							_	9.60	1392.24	Very tight. Aborted.
1/19	764.5	Pretest						7.70	1116.35	9.52	1380.80	Good test.
1/20	765.5	Pretest						7.90	1117.40	9.53	1382.53	Good perm.
1/21	761.0	Pretest						_	-	9.49	1376.98	Very tight. Aborted.
1/22	757.5	Pretest	•					•••	_	9.44	1368.68	Tight. Aborted.
1/23	812.0	Pretest						8.48	1185.94	10.10	1464.21	Valid test.
1/24	758.0	Pretest						7.63	1105.96	9.45	1371.24	Good perm.
								MPag	Psig	MPag	<u>Psig</u>	
2/25	812.8	45.4 10.4 (	0.25 Not ope	- (boar	0.009	-	12.00	8.12	1177	10.05	1458	Aborted. Seal failure.
2/26	812.0	Sample	itor ope	:11 <b>0U</b> )				-	-	10.04	1456	No seal. Aborted.



#### SUMMARY OF WIRELINE FORMATION TEST PROGRAMME - LEATHERJACKET-I

TEST &	DEPTH			RECOVER	RY (LITE	RES) FORMATION	MUD		TT-PACKARD ION PRESSURE	***********	ETT-PACKAR	
SEAT NO.		CHAMBER	OIL	COND.	GAS	WATER	FILTRATE	MPag	Psig	MPag	Psig	REMARKS
	<u>K.B.</u>				_				<del></del>			
		Litres	Litres	Litres	m <sup>3</sup>	Litres	Litres					
2/27	812.0	Sample (	(Reset)						_	10.05	1457	No seal. Aborted.
2/28	811.8	Sample						_	-	10.04	1456	No seal. Aborted.
2/29	812.8	Sample						_		10.05	1458	No seal. Aborted.
2/30	812.7	Sample						-	_	10.05	1458	No seal. Aborted.
2/31	818.2	Test							_	10.12	1468	Checking packer seal.
2/32	813.0	Sample						8.11	1176	10.06	1459	Very tight, sample run ended
2 /77	012.0											prematurely.
2/33	812.9	Sample						-	-	10.05	1457	Very tight. Sample taken.
2/34 2/35	812.7	Sample						-		10.04	1456	Seal Failure. Aborted.
	812.8	Sample						-		10.05	1457	Very tight. Aborted.
2/36	812.1	Sample							-	10.03	1455	No seal. Aborted.
2/37	812.0	Sample						-	~	10.04	1456	No seal. Aborted.
2/38	811.9	Sample						-	-	10.04	1456	Seal failure. Aborted.
2/39	811.5	Sample						-	~-	10.03	1455	No seal. Aborted.
2/40	764.5	Sample							-	9.45	1371	No seal. Aborted.
3/41	765.4	Sample:						-	-	9.45	1370	No seal. Aborted.
3/42	764.5	Sample						7.60	1103	9.43	1368	Seal lost during sampling. Aborted.
3/43	764.5	Sample						_	-	9.43	1367	No seal. Aborted.
3/.44	764.7	Sample						7.87	1141	9.43	1367	Sampling aborted. Hydrostatic
2.45												pressure achieved on sampling.
3/45	764.7	Reset						-	-	9.40	1363	No seal.
3/46	765.0	45.4 10.4 (F	26.0 Preserv	- ed)	0.218	-	17.0	7.60	1102	9.43	1368	Pretest good. Samples to upper & lower chambers.

LOGGING RUN	THERMOMETER DEPTH (MKB)	MAX. RECORDED TEMPERATURE (C°)	CIRCULATION TIME (t <sub>k</sub> ) (hours)	TIME AFTER CIRCULATION STOPPED (t)	HORNER TEMPERATURE (C°)	GEOTHERMAL GRADIENT (C°/km)
Suite 1						
DLTE-MSFL-GR-SP	948.0	50	.5	36	50.5	49.2
LDT-CNTH-GR	948.0	48	.5	9		
RFT-GR	950.0	49	.5	17		
HDT-GR	950.0	49	.5	12.6		
WST	950.0	50	.5	32.67		

8.

FIGURES

# LOCALITY MAP LEATHERJACKET-1

SCALE 1:250000

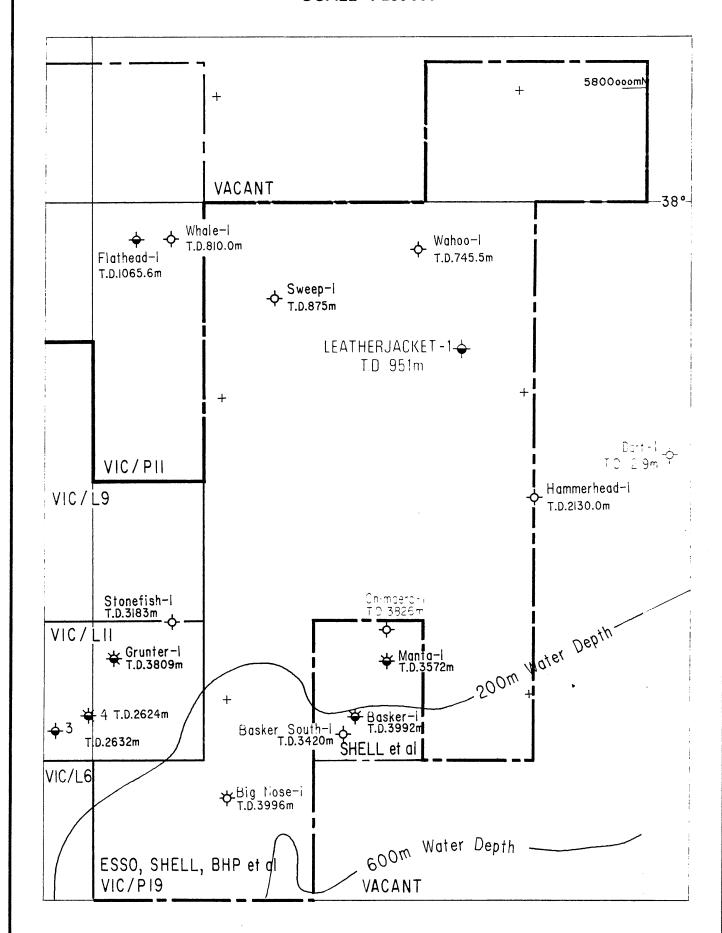
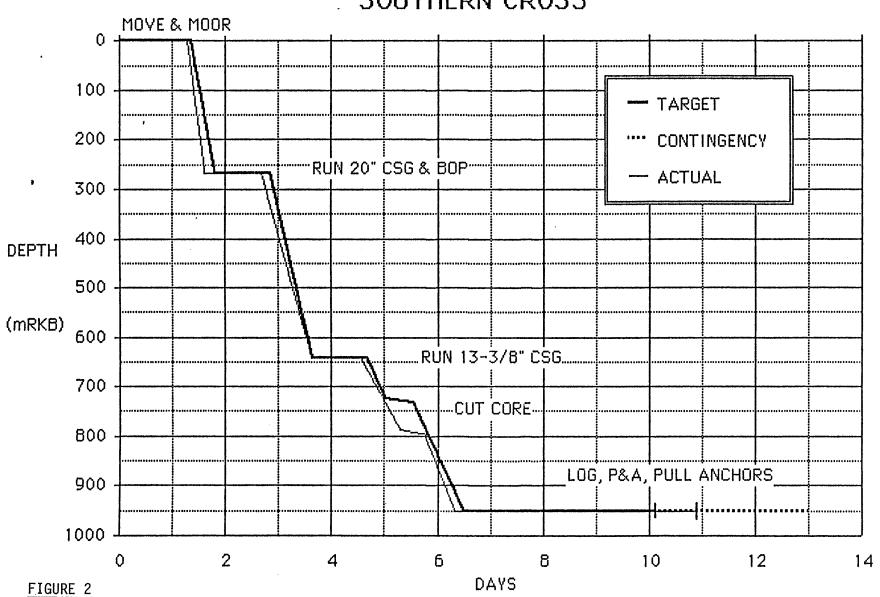


Figure 1

Dwg. 2339/0P/4

# LEATHERJACKET 1 PROGRESS CURVE SOUTHERN CROSS





# LEATHERJACKET-1 WELLBORE SCHEMATIC

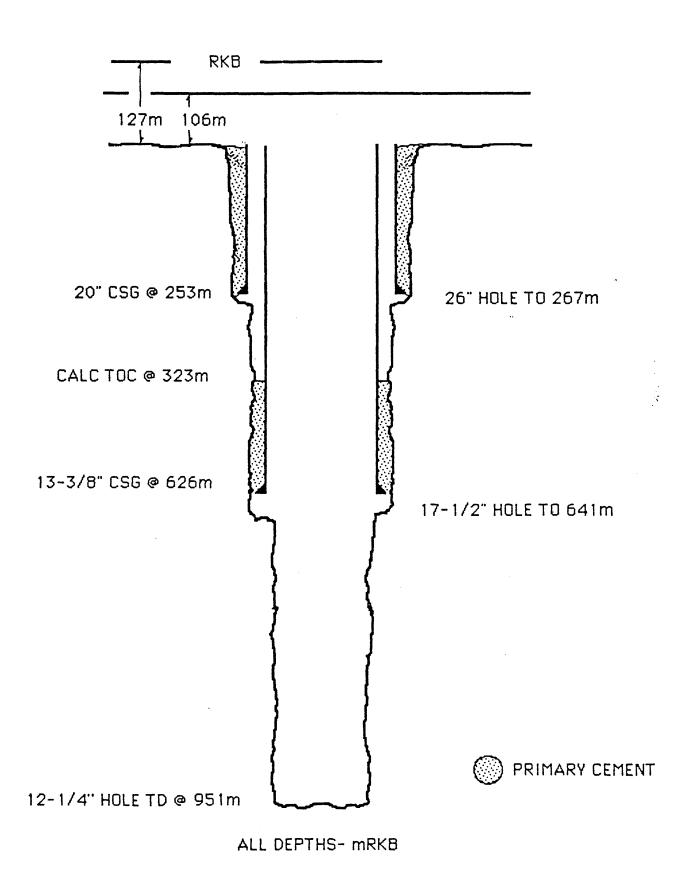


FIGURE 3

# LEATHERJACKET-1 ABANDONMENT SCHEMATIC

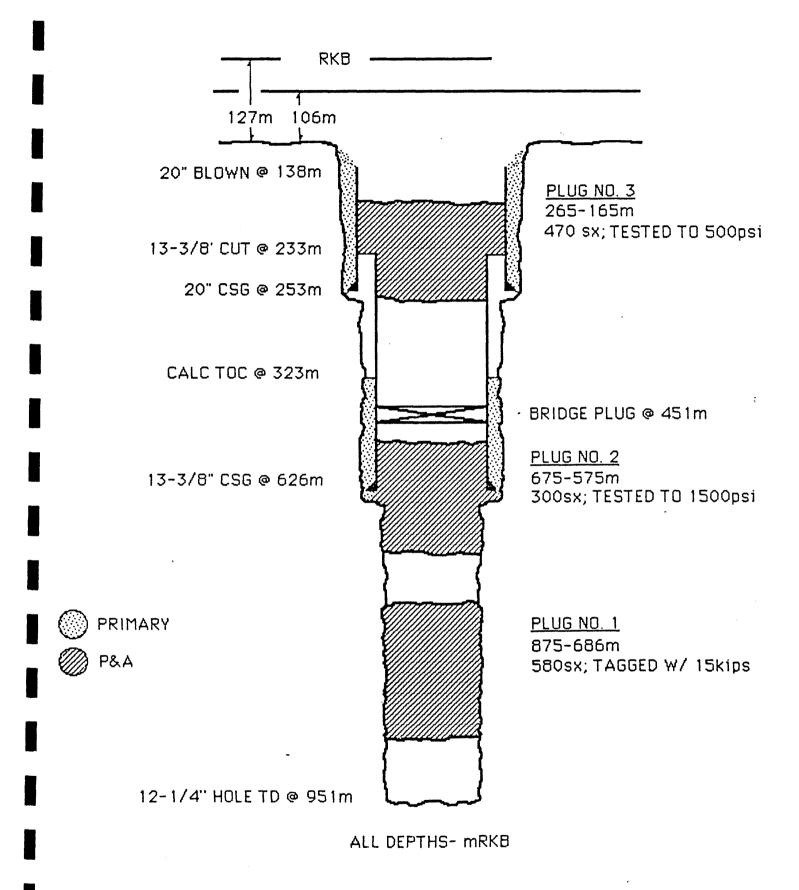
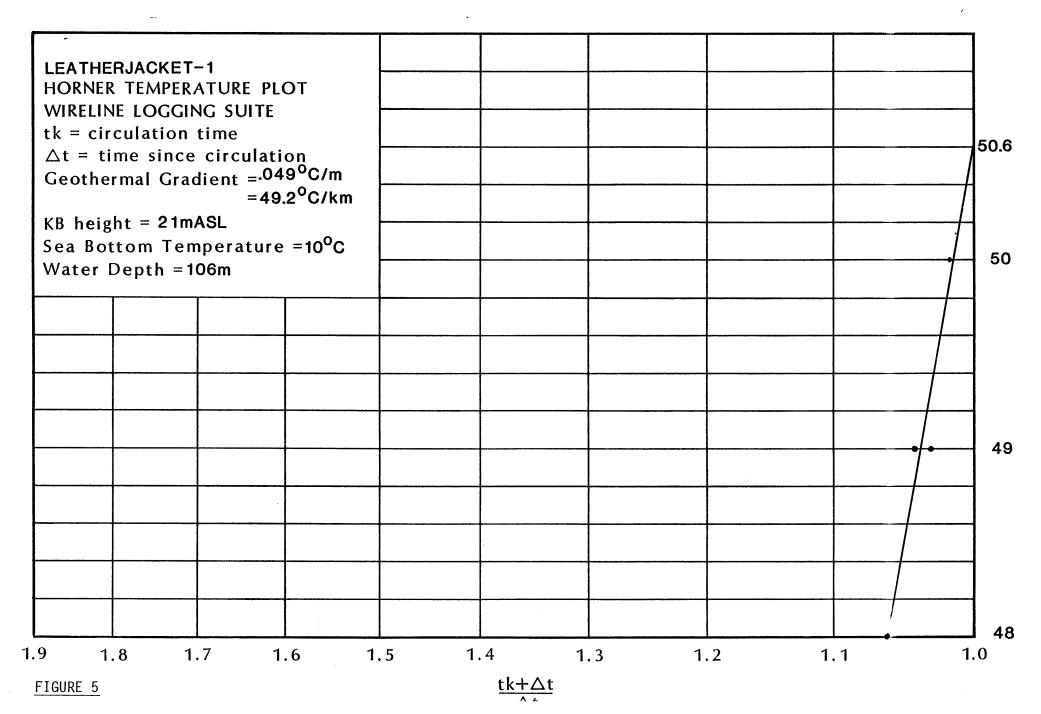


FIGURE 4





APPENDIX 1

#### LEATHERJACKET-1

## Lithology Descriptions

<u>Depth</u>	<u>%</u>	<u>Descriptions</u>
280m	80 20 Trace	FOSSIL FRAGMENTS. CEMENT. CALCARENITE, QUARTZ, GLAUCONITE and PYRITE.
280 - 290m	85 15 Trace	FOSSIL FRAGMENTS. CEMENT. CALCARENITE, QUARTZ, GLAUCONITE and PYRITE.
290 - 300m	80 10	FOSSIL FRAGMENTS. LIMESTONE: Calcarenite: grey to light grey, firm to moderately hard, skeletal. CEMENT.
300 - 310m	90 10 Trace	LIMESTONE: Calcarenite: grey to light grey, firm to moderately hard, skeletal; very fossiliferous, up to 80% coral and shell fragments.  CEMENT.  PYRITE: with glauconite.
310 - 320m	95 5 Trace	LIMESTONE: Calcarenite: as above; very fossiliferous, up to 80% coral and shell fragments. CEMENT. PYRITE: with glauconite.
320 - 330m	95 5	LIMESTONE: as above. CEMENT.
330 - 340m	95 5 Trace	LIMESTONE: Calcarenite: as above; with occasional calcisiltite; abundant fossils -bryozoa, molluscs, coral stems and shell fragments. CEMENT. PYRITE: with glauconite.
340 - 350m	100	LIMESTONE: Calcarenite: grey to light grey, firm to moderately hard. Calcisiltite: abundant fossils, trace cement, pyrite and glauconite.
350 - 360m	100	LIMESTONE: 80% Calcarenite: 20% Calcisiltite: otherwise as above.
360 - 370m	100	LIMESTONE: 80% Calcarenite: grey to light grey, firm to hard, angular quartz grains, containing skeletal fragments. 20% Calcisiltite: light grey to grey, soft, abundant fossil shell fragments and forams, bryozoa, sponge spicules, coral stems and molluscs; trace pyrite, quartz, glauconite.
370 - 380m	100	LIMESTONE: as above.

380 - 390m	100	LIMESTONE: as above; but grading to siltstone and very fine sandstone with argillaceous matrix and shell fragments.
390 - 400m	100	LIMESTONE: as above.
400 - 410m	100	LIMESTONE: as above; with 70% Calcarenite, 30% Calcisiltite.
410 - 420m	100	LIMESTONE: as above.
420 - 430m	100	LIMESTONE: 60% very fine grained Calcarenite: grey to light grey, soft; abundant fossils; trace pyrite encrusted quartz, and glauconite.
430 - 440m	100	LIMESTONE: as above.
440 - 450m	100	LIMESTONE: 80% Calcisiltite: grey, soft. 20% Calcarenite: abundant fossils; trace quartz, pyrite.
450 - 460m	100	LIMESTONE: 70% fine grained Calcarenite: light grey, firm to hard. 30% Calcisiltite: minor very fine grained sandstone, fossils common; trace pyrite, glauconite and calcite.
460 - 470m	100	LIMESTONE: as above.
470 - 480m	100	LIMESTONE: as above.
480 - 490m	100	LIMESTONE: as above.
490 - 500m	100	LIMESTONE: 70% Calcarenite: light grey, soft to firm. 30% Calcisiltite: light grey, soft. Fossils common: forams, bryozoa, molluscs, coral stems and shell fragments; trace pyrite, glauconite and fine grained sandstone.
500 - 510m	100	LIMESTONE: as above.
510 - 520m	100	LIMESTONE: as above.
520 - 530m	100	LIMESTONE: 60% Calcarenite: light grey to grey, soft to firm. 40% Calcisiltite: abundant fossil and foram fragments, trace pyrite and glauconite.
530 - 540m	100	LIMESTONE: as above
540 - 550m	100	LIMESTONE: 60% Calcarenite, 40% Calcisiltite: as above.
550 - 560m	100	LIMESTONE: 60% Calcarenite, 40% Calcisiltite: as above.
560 - 570m	100	LIMESTONE: 50% Calcarenite: light grey to grey, soft to firm, grading to silty. 50% Calcisiltite: light grey to grey, soft, fossil fragments and forams common; minor pyrite, occasionally argillaceous.

570 - 580m	100	LIMESTONE: 50% Calcarenite, 50% Calcisiltite: as above.
580 - 590m	100	LIMESTONE: 40% Calcarenite: as above; becoming clayey. 60% Calcisiltite: as above.
590 - 600m	100	LIMESTONE: 80% Calcarenite, 20% Calcisiltite: as above.
600 - 610m	100	LIMESTONE: 90% Calcarenite: light grey to dark grey, firm to hard, occasionally silty in parts with loose white quartz grains. 10% Calcisiltite: as above.
610 - 620m	100	LIMESTONE: Calcarenite: as above
620 - 630m	100	LIMESTONE: Calcarenite: as above; occasional quartz, white to clear, very coarse grained, angular, well sorted.
630 - 640m	100	LIMESTONE: Calcarenite: as above.
		C.B.U. PRIOR TO RUNNING 13-3/8" CASING.
640 - 645m	60	LIMESTONE: 40% Calcisiltite: medium grey, soft to firm, variably glauconitic. 20% Calcarenite: as above; contains forams, bryozoan, occasional coarse quartz grains.
	. 40	CEMENT CONTAMINATION.
645 - 650m	40 30 30	SANDSTONE: light grey, very fine to fine grained, firm to moderately hard, subangular, good sorting, variably glauconitic, occasional loose fossils, calcareous cement, tight.  LIMESTONE: Calcisiltite: as above.  CEMENT CONTAMINATION.
650 – 655m	80 20 Trace Trace	LIMESTONE: Calcisiltite: as above SANDSTONE: as above; occasional forams and bryozoan fragments. CEMENT CONTAMINATION. QUARTZ GRAINS: clear to translucent, coarse to very coarse grained, well rounded.
655 - 660m	100	LIMESTONE: Calcisiltite: as above, mainly
	Trace	soft. SANDSTONE: as above, occasional fossil fragments (bryozoan).
660 - 665m	100	LIMESTONE: Calcisiltite: as above; with occasional quartz grains, subrounded to rounded, medium to coarse grained.
665 - 670m	100	LIMESTONE: 50% Calcisiltite: as above. 50% Calcilutite: light to medium grey, soft to firm, occasional glauconitic (disseminated) grading to calcisiltite, as above.
670 - 675m	100	LIMESTONE: 80% Calcisiltite: medium to light grey, firm, variably glauconitic (disseminated), occasionally loose fossil fragments (broyozoan). 20% Calcilutite: as above; occasional quartz fragmented grains.

675 - 680m	100	LIMESTONE: 80% Calcisiltite: as above; rare, loose, very coarse quartz grains; rare fossil fragments. 20% Calcilutite: as above.
680 - 685m	100	LIMESTONE: Calcisiltite: dominantly light grey; otherwise as above.
685 - 690m	100	LIMESTONE: Calcisiltite: soft, otherwise as above; occasional quartz grains (medium grained).
690 - 695m	100	LIMESTONE: Calcisiltite: as above.
695 - 700m	100	LIMESTONE: Calcisiltite: as above.
700 - 705m	100	LIMESTONE: Calcisiltite: as above.
705 - 710m	100	LIMESTONE: Calcisiltite: as above; slightly more glauconitic.
710 - 715m	80 20 Trace Trace	LIMESTONE: Calcisiltite: as above; occasional fossil fragments (bryozoans & forams).  SANDSTONE: light to medium grey, very fine grained, moderately hard; calcareous cement; tight.  GLAUCONITE: nodules.  PYRITE.
715 - 720m	80 20 Trace Trace	LIMESTONE: Calcisiltite: as above; occasional fossil fragments (bryozoans & forams). SANDSTONE: as above. GLAUCONITE NODULES. PYRITE.
720 - 725m	70 30	LIMESTONE: Calcisiltite: as above; occasional fossil fragments (bryozoans & forams). SANDSTONE: as above.
725 - 730m	100 Trace Trace	LIMESTONE: Calcisiltite: as above. SANDSTONE: as above. GLAUCONITE.
730 - 735m	50 50	SANDSTONE: clear to translucent, very fine to fine quartz grains in aggregates; calcite cement; glauconite; fossil fragments (bryozoan, forams); tight; no shows.  LIMESTONE: Calcisiltite: as above.
	Trace	GLAUCONITE NODULES: CIRCULATED BOTTOMS UP.
735 - 738m	80 20 Trace	LIMESTONE: Calcisiltite: as above. SANDSTONE: as above; no shows. GLAUCONITE NODULES.
738 - 745m	90 10	LIMESTONE: Calcisiltite: as above. SANDSTONE: as above.
		BOTTOMS UP SAMPLE ON DRILLING BREAK.

		·
745 - 750m	70 30 Trace Trace	SANDSTONE: 2 types: Type (1) - 50% greyish-red, iron stained quartz, very fine to fine grained and medium grained, hard aggregates; silica cemented with glauconite; very poor visible porosity; no shows.  Type (2) - 20% clear to translucent, very fine to fine quartz grains in aggregates; calcite cement; glauconite; fossil fragments (bryozoan, forams); tight; no shows.  LIMESTONE: Calcisiltite: as above.  GLAUCONITE NODULES.  PYRITE.
750 – 755m	70 30 Trace Trace	SANDSTONE: 40% Type (1) - as above; no shows.  30% Type (2) - loose grains, milky to clear quartz, coarse to very coarse grained, subangular to subrounded; excellent inferred porosity; no shows.  LIMESTONE: Calcisiltite: as above.  PYRITE. GLAUCONITE NODULES.
755 - 760m	60 30 10 Trace	SANDSTONE: 40% Type (1) - as above; no shows. 20% Type (2) - as above; no shows. LIMESTONE: Calcisiltite: ?cavings, as above. COAL: slivers, black. GLAUCONITE NODULES. CHANGE BIT TO J22 @ 763m.
760 - 763m	60 10 10 10 Trace	SANDSTONE: Type (2) - as above; medium to very coarse grained, very poor sorting; no shows. SILTSTONE: as above. COAL: slightly fissile. LIMESTONE: Calcisiltite: cavings as above. PYRITE.
763 - 765m	80 20	LIMESTONE: Calcisiltite: cavings. SANDSTONE: as above; no shows.
765 - 770m	60 40 Trace	LIMESTONE: Calcisiltite: as above; cavings. SANDSTONE: as above; trace yellow-white fluorescence; trace yellow-white crush cut; diffuse to slightly streaming. PYRITE.
770 - 775m	100	SANDSTONE: Clear, loose, coarse to very coarse grained, rounded to well rounded, well sorted quartz grains; 10% yellow-white fluorescence; no instant cut; slow streaming crush cut; clear residue with faint yellow-white fluorescence; no oil staining.
775 - 780m	100	SANDSTONE: as above; 15% fluorescence, as above - generally more diffuse crush cut.
780 - 785m	90 10	SANDSTONE: as above; 25% fluorescence, as above - almost all diffuse slow crush cut. LIMESTONE: Calcisiltite: as above; cavings.

- 6 -

785 - 787m	70	SANDSTONE: as above; 50% fluorescence, as above - generally more diffuse crush cut.
	30	CARBONACEOUS SILTSTONE: as above; grading to coal.
		C.B.U. PRIOR TO CUTTING CORE NO. 1 @ 787M.
787.Om	100	SANDSTONE: light grey, loose grains of clear to translucent quartz, fine to very coarse grained, dominantly medium grained, dominantly subangular, very poor sorting; excellent visible porosity; 100% bright pale yellow fluorescence, giving instantaneous blue-white cut; strong hydrocarbon odour; brown oil clearly observable.
788.Om	100	SANDSTONE: light grey, loose grains, fine grained, excellent sorting, subangular to subrounded, dominantly subrounded; excellent visible porosity; 80% bright pale yellow fluorescence, giving instantaneous blue-white cut; hydrocarbon and hydrogen sulphide odour; no oil seen.
789.Om	100	SANDSTONE: light grey as above; only trace fluorescence as above; trace H <sub>2</sub> S odour.
790.Om	100	SANDSTONE: light grey as above; only trace fluorescence as above; slight hydrocarbon odour; trace H <sub>2</sub> S odour.
791.Om	100	SANDSTONE: medium grey as above; no fluorescence; slight hydrocarbon odour; trace $H_2S$ odour.
792.Om	100	SANDSTONE: medium grey as above; no fluorescence; slight hydrocarbon odour.
793.Om	100	SANDSTONE: medium grey, as above; no fluorescence; slight hydrocarbon odour.
794.Om	100	SANDSTONE: medium grey, as above; no fluorescence; slight hydrocarbon odour.
794.64m	100	SANDSTONE: medium grey, as above; no fluorescence; slight hydrocarbon odour.
795 - 800m	90	SANDSTONE: light grey, clear to translucent quartz, medium to very coarse grained, dominantly medium to coarse grained, subrounded to subangular, loose grains; 5% bright yellow fluorescence; blue-white crush cut.
	10	COAL: black, blocky, earthy lustre, some rounded (cavings).
800 - 805m	80	SANDSTONE: as above; with 10% fluorescence as above and streaming blue-white crush cut.
	10	SILTSTONE: grey to red, hard, carbonaceous flecks.
	10	COAL: as above.

805 - 810m	90	SANDSTONE: as above; with 5% fluorescence as above and streaming white to blue-white crush cut.
•	10	SILTSTONE: as above.
810 - 815m	90	SANDSTONE: as above; with 30-40% bright pale yellow fluorescence with blue-white crush cut.
	10	SILTSTONE: as above.
815 - 820m	100	SANDSTONE: very light grey, clear to translucent quartz, medium to very coarse grained, dominantly subrounded, loose grains; excellent visible porosity; 30-40% bright pale yellow fluorescence; brown oil stain; blue-white crush cut.
820 - 825m	90	SANDSTONE: as above; with coarse grains dominant; 20% fluorescence with blue-white crush cut.
	10	SHALE.
825 - 830m	90	SANDSTONE: light grey, clear to milky quartz, very coarse to granule grain size, subangular, very poor sorting; excellent visible porosity; 10-20% bright pale yellow fluorescence giving blue-white streaming cut.
	10	SILTSTONE: as above.
		BOTTOMS UP SAMPLE
830 - 836m	60	SANDSTONE: 2 types: Type (1) - light grey, clear to milky quartz, very coarse to granule grain size, subangular, very poor sorting; excellent visible porosity; less than 10% bright pale yellow fluorescence giving blue-white streaming cut.  Trace Type (2) - fine grained aggregates of quartz.
	30	SILTSTONE: Type (1) - pale green (chloritic) grading to very fine grained siltstone; hard cement, noncalcareous.
	10	SILTSTONE: Type (2) - light to medium grey, grading to very fine sandstone.
836 - 840m	50	SANDSTONE: Type (1) - as above; with 5% pale yellow fluorescence; no cut or crush cut.
	40	CONGLOMERATE: pale green (?chlorite) granule/pebble fragments, milky quartz, well rounded, very hard.
	10	SILTSTONE: Type (2) - as above.
	Trace Trace	COAL: rounded grains, probably cavings. GLAUCONITE NODULES: ?cavings.
	Trace	JASPER: Orange quartz grains.
		BOTTOMS UP SAMPLE (DRILLING BREAK)
840 - 842m	70	?LITHARENITE: pale green (?chlorite) lithic fragments of pale green and grey indurated siltstone, orange jasper.
	30	SANDSTONE: 2 types: Type (1) - clear to milky quartz, medium to coarse grained, subrounded, poorly sorted; no shows.  Trace Type (2) - fine grained aggregates of
	Trace	quartz in a silica cement. COAL: ?cavings as above.
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842 - 845m	70 30	LITHARENITE: as above. SANDSTONE: Type (1) - as above; trace shows.
845 - 850m	80	SILTSTONE: greyish red, soft, ?carbonaceous flecks, grading to very fine sandstone.
	10 10	SANDSTONE: Type (1) - as above; no shows. ?LITHARENITE: as above.
850 - 855m	60 20 20	SILTSTONE: as above; also light to medium grey. LITHARENITE: as above. SANDSTONE: as above.
855 - 860m	70	LITHARENITE: as above; with minor buff coloured feldspar; no shows.
	20 10	SILTSTONE: as above. COAL: angular, shiney lustre, slivers.
860 - 865m	10	LITHARENITE: coarse to very coarse rock fragments consisting of angular quartzitic, siltstone (indurated) and mudstone (indurated), very hard; varying colours - pale green (dominant), white, buff, orange, grey (various shades); no shows.  SILTSTONE: as above.
	10	COAL: as above.
865 - 870m	100	LITHARENITE: as above - probably conglomeratic in parts.
870 - 875m	100	LITHARENITE: as above - large amounts of felsic volcanics and microgranite fragments.
875 - 880m	100	LITHARENITE: as above.
880 - 885m	100 Trace	LITHARENITE: as above. COAL: as above.
885 - 890m	100	LITHARENITE: as above; no shows.
890 - 895m	100	LITHARENITE: as above; no shows.
895 - 900m	100 Trace	LITHARENITE: as above; no shows. SILTSTONE: white, soft, kaolinitic.
900 - 905m	100 Trace	LITHARENITE: as above. SILTSTONE: dark grey, indurated, hard, angular cuttings.
905 - 910m	100	LITHARENITE: as above.
910 ~ 915m	60	SANDSTONE: white to translucent, hard, medium to coarse grained, subangular to subrounded, quartz grains and aggregates; tight; no shows.
	40	LITHARENITE: as above.
915 - 920m	60 40	LITHARENITE: as above. SANDSTONE: as above.
920 - 925m	60	LITHARENITE: coarse to very coarse grained, multicoloured fragments of volcanics, quartzites and granite, set in a matrix of poorly sorted, very fine grained quartz and lithic grains; tight; no shows.

920 - 925m cont'd	40	SANDSTONE: clear to white, fine to very coarse grained, subangular to subrounded, aggregates and loose grains of quartz; tight; no shows.
925 - 930m	60 40 Trace	LITHARENITE: as above; no shows. SANDSTONE: as above; no shows. COAL: as above
930 - 935m	70 30	LITHARENITE: as above; no shows. SANDSTONE: as above; no shows.
935 - 940m	70 30	LITHARENITE: as above; no shows. SANDSTONE: as above; no shows.
940 - 945m	80 20	LITHARENITE: as above; no shows. SANDSTONE: as above; no shows.
945 - 951m	90 10 Trace	LITHARENITE: as above; no shows. SANDSTONE: as above; no shows. COAL: as above.

POOH PRIOR TO LOGGING.

2153L/1-9

APPENDIX 2

Core No.

Well

: LEATHERJACKET-1

(83.5%)

Interval Cored:

787.0-796.lm

Cut

9.14m

Bit Type

100

RC4

Described by

P. FELL

Recovered

: 7.64m

: 9-7/8"

Bit Size Date

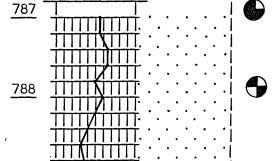
: 27th February, 1986

Depth &

Int. (m)

ROP (m/hr) Graphic Shows

Descriptive Lithology



787.0m SANDSTONE - light grey, loose, clear to translucent quartz, fine to very coarse grained, predominantly medium grained, subangular, very poorly sorted; excellent visible porosity; 100% bright, pale yellow to white fluorescence with instant blue-white cut; strong hydrocarbon odour; possible H<sub>2</sub>S odour; free oil observed.

788.0m SANDSTONE - as above; with 80% fluorescence and no free oil.

NOTE: Oil water contact between 788.0-789.0m.

789.0 - 790.0m SANDSTONE - as above; with only trace fluorescence as above and slight hydrocarbon odour.

790.0 - 794.64m SANDSTONE - medium grey; slight hydrocarbon odour; no fluorescence; otherwise as above.

794.64 - 796.1m NO RECOVERY.

791

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789

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796 |||||**|**||||

APPENDIX 3

## LEATHERJACKET-1

## SIDEWALL CORE DESCRIPTIONS

No.	<u>Depth</u>	Rec.	Rock Type	Description
1	933.5	28	CONGLOMERATE	Dark green to grey, very poorly sorted, subrounded to subangular, firm to hard, coarse to very coarse grained in sand matrix; granules and pebble clasts.
2	910.7	36	CONGLOMERATE	Dark green to grey, very poorly sorted, subrounded to subangular, firm to hard, coarse to very coarse grained in sand matrix; granules and pebble clasts.
3	898.5	22	SANDSTONE	Light to dark grey, medium to coarse grained, moderately to well sorted; subangular to subrounded, friable to firm; slightly calcareous; quartzose; no visible porosity; silica cement.
4	884.8	25	CONGLOMERATE/ ?LITHIC SANDSTONE	Dark green to grey, medium to very coarse grained, poorly sorted, angular to subrounded, friable to firm; quartz and rock fragments with minor pebbles; tight.
5	863.8	27	CONGLOMERATE/ ?LITHIC SANDSTONE	Grey black to dark green, silt to very coarse grained, very poorly sorted, angular to subrounded, soft to friable; subrounded quartz, rock fragments and pebbles; tight.
6	855.9			PULLED OFF
7	849.0	42	SANDSTONE	Light grey, very fine to fine grained, well sorted, subrounded to well rounded, soft to friable; quartz, silica cement; thin laminae (less than lmm) carbonaceous matter; poor visible porosity.
8	838.8	41	SANDSTONE	Light grey, fine to very coarse grained, very poorly sorted; subrounded to angular; friable; quartz and lithic grains.
9	834.3	46	?CONGLOMERATE	Green to grey, granule to pebbly grained, very poorly sorted, angular to rounded, friable to firm; clay matrix; tight; quartz and slate clasts.
10	827.8	28	?CONGLOMERATE	Green to grey, granule to pebbly grained, very poorly sorted, angular to rounded, friable to firm; clay matrix; tight; quartz and slate clasts.
11	820.7	52	SANDSTONE	White to pale grey, quartzose, fine to coarse grained, moderately sorted, subangular to subrounded, friable to firm; tight, white argillaceous matrix.

12	818.6	18	SANDSTONE	White to off white, very fine to medium grained, well sorted, subangular to rounded, firm to indurated; quartz; 30% even bright white-yellow fluorescence; slow to diffuse white cut; white residue.
13	813.1	15	?CONGLOMERATE/ SANDSTONE	White to grey brown, very fine to medium grained, very poorly sorted, rounded to subrounded; interbedded pebble conglomerate, quartz, in argillaceous matrix; 60% even bright yellow-white fluorescence; very slow diffuse white cut; white residue; mild hydrocarbon odour.
14	809.9	54	SANDSTONE	Grey to green grey, very fine grained, moderately sorted, well rounded, soft to friable; slightly calcareous; silty; extensive glauconite staining.
15	806.0	44	SANDSTONE	Grey, very fine to fine grained, well sorted, subrounded to rounded, soft to friable; no matrix or cement; minor glauconite staining; moderate visible porosity; finely laminated.
16	800.0	49	SANDSTONE	Medium grey, very fine to fine grained, very well sorted, subrounded to rounded, friable; slightly calcareous; argillaceous matrix; poor visible porosity.
17	775.9	47	SANDSTONE	Medium grey, very fine to medium grained, poorly sorted, subrounded, friable; laminated carbonaceous, argillaceous, tight; 60% even (over sand part) bright yellow-white fluorescence; instant to streaming blue-white cut; blue-white residue; hydrocarbon odour.
18	770.5	49	SANDSTONE	Medium grey, very fine grained, very well sorted, soft; slightly calcareous; argillaceous; 10% (on a thin laminae) pale yellow fluorescence; instant to streaming pale to blue white cut; blue-white residue; hydrocarbon odour.
19	765.0	14	SANDSTONE	Light grey, fine to medium grained, moderately sorted, subangular to subrounded, friable; moderately calcareous; yellow-grey argillaceous matrix; 100% even bright yellow fluorescence; instant blue-white cut; blue-white residue; hydrocarbon odour.
20	761.1	19	SANDSTONE	Medium to light grey, fine to occasionally coarse grained, moderately sorted, subangular to subrounded, firm; slightly calcareous; light grey argillaceous matrix.
21	759.8	36	SILTSTONE	Dark grey, firm; carbonaceous.

2	?2	757.4	20	PEBBLY SANDSTONE	Blue-grey to brown red, very fine to pebbly grained, very poorly sorted, angular, soft; slightly calcareous; glauconitic; blue-grey slate clasts; tight.
2	?3	755.7	47	SILTSTONE	Very dark olive grey, soft; occasional quartz grains, very pyritic and glauconitic; pyrite retains crystal shape (in situ growth?).
2	?4	754.0	46	SANDSTONE	Very dark olive grey, very fine grained, well sorted, subrounded, firm; slightly calcareous; glauconitic.
2	25	752.5	42	SANDSTONE	Grey, very fine to occasionally medium grained, poorly sorted, subrounded, soft; very silty, slightly glauconitic; tight.
2	?6	750.8	45	SANDSTONE	Grey, very fine grained, well sorted, subrounded, soft; argillaceous; tight.
2	27	747.3	10	CONGLOMERATE	Olive, medium to pebble grained, poorly sorted, angular, soft; slightly calcareous; angular sandstone and slate clasts; silt/sandstone matrix.
2	!8	745.6	36	SILTSTONE	Olive grey, soft; very glauconitic; Gurnard formation.
2	!9	742.1	51	CALCILUTITE	Light grey, clay, soft to puggy; extremely calcareous; Lakes Entrance formation.
3	10	740.3	43	CALCILUTITE	Light grey, clay, soft to puggy; extremely calcareous; Lakes Entrance formation.

# <u>LEATHERJACKET-1</u> <u>SIDEWALL CORE GAS ANALYSIS</u>

	NO.	DEPTH (mkb)	C1	C2	C3 (ppm)	C4	C5	C6
-	11	820.7	57	2.0	1.2	Tr	-	_
	12	818.6	63	2.0	1.4	Tr	-	-
	13	813.1	23	1.5	3.5	3.6	3.5	1.4
	18	770.5	86	7.9	3.5	2.2	Tr	-
	19	765.0	107	7.0	0.5	Tr	2.7	Tr
:	20	761.0	19	3.4	0.5	Tr	3.9	0.6

APPENDIX 4

GEOLOGIST/ENGINEER: ECI / LSG / PF

WELL: <u>LEATHERJACKET-1</u>
DATE: <u>28 FEBRUARY 1986</u>

RFT No. Run/Seat		epth m TVDSS KB=21	Initial Hydros HP / RFT gau psia / psig	ıge	Set	Minimum Flowing Pressure	Formation Press HP / RFT gaug psia / psig	ge	°C ¯	Time Retract	Final Hydrost HP / RFT ga psia / psig		Comments (include Probe type	e)
RFT TYPE			MPa/g	ppg		psia (Pretest)		ppg			MPa/g		<pre>L = Long nose probe M = Martineau probe</pre>	
1/1 Prete		825.8	1526.6 /1518 10.53	10.5	4:00:00	1223.3	1233.86 / 1225 8.51	8.8	47.11	4:05:00	1527.3/1518 10.53	10.5	Good test. Very high perm.	I
1/2 Prete	824.0 st	803.0	1489.0/1478 10.27	10.5		2.74			46.6	4:15:00	1489.0/ - 10.27		Very tight	I
/3 Prete		802.0	1487.0/1476 10.25	10.5	4:19:00	1.44			46.6	4:21:00	1487.0/1476 10.25	10.5	Very tight Aborted.	J
./4 Prete		801.0	1486.0/1475 10.25	10.5	4:26:00	1.22			46.1	4:27:00	1486.0/1475 10.25	10.5	Very tight Aborted.	I
/5 Prete		800.0	1484.0/1473 10.23	10.5	4:31:00	0.87			45.9	4:32:00	1484.0/1474 10.23	10.5	Very tight Aborted.	I
/6 Prete		817.0	1514.0/1504 10.44	10.5	4:38:30	0.73			45.9	4:39:30	1514.0/1504 10.44	10.5	Very tight Aborted.	L
/7 Pretes		797.0	1479.0/1469 10.20	10.5		908.00			45.8	4:47:20	1479.9/1468 10.20		Loss of Seal Aborted.	L
/8 Pretes	818.2 st	797.2	1479.56/1468 10.20	10.5	4:51:00	0.99			45.8	4:52:00	1479.80/ 1468 10.20	10.5	Very tight Aborted.	
./9 Pretes		796.3	1477.88/1467 10.19	10.5	4:56:20				45.7	4:57:40	1478.44/1468			L

GEOLOGIST/ENGINEER: <u>ECI / LSG / PF</u>

WELL: LEATHERJACKET-1
DATE: 28 FEBRUARY 1986

RFT No. Run/Seat			Initial Hydros HP / RFT gau psia / psig			Minimum Flowing Pressure	Formation Pres HP / RFT gau psia / psig	ıge		Time Retract	Final Hydrost HP / RFT ga psia / psig	uge	(include Probe type	
RFT TYPE			MPa/g	ppg		psia (Pretest)	MPa/g	ppg			MPa/g	ppg	L = Long nose probe M = Martineau probe	
1/10 Pretes		796.3	1478.49/1468 10.19	10.5	4:58:50	)			45.0	5:00:10	1478.29/1467 10.19		Loss of Seal Aborted.	L
1/11 Pretes		792.0	1470.61/1460 10.14	10.5		1.45			45.6	5:05:31	1470.06/1459 10.14		Extremely tight Aborted.	L
1/12 Pretes		783.0	1455.38/1444 10.03	10.5		1076.15	1170.90/1160 8.07	8.8	45.3	5:19:00	1454.28/1443 10.03		"Sticky" Good test.	L
1/13 Pretes		772.7	1435.86/1424 9.90	10.5			1155.85/1143 7.97		45.1	5:27:00	1435.87/1423 9.92		Good test.	L
1/14 Pretes		768.8	1429.50/1416 9.86	10.5		5 1116.66	1150.29/1139 7.93		44.8	5:39:50	1428.13/1416 9.85			L
1/15 Pretes	788.5 t	767.5	1425.63/1413 9.83	10.5	5:44:10	943.91			44.6	5:46:10			Invalid test RESET.	L
1/16 Sample		767.5	1424.63/1413 9.82	10.5		464.90	1148.06/1136 7.92	8.8	44.6	18:53:00	1424.0/1411 9.82		Very tight (sample) Aborted	L
1/17 Pretes		749.5	1392.48/1379 9.60	10.5	19:00:40	)			44.1	19:02:06			Lost seal Aborted.	L
1/18 Pretes		749.5	1392.24/1379 9.60	10.5		73.20				19:05:16			Very tight Aborted	L

GEOLOGIST/ENGINEER: ECI / LSG / PF

WELL: <u>LEATHERJACKET-1</u>
DATE: <u>28 FEBRUARY 1986</u>

RFT No. Run/Seat			Initial Hydros HP / RFT gaug psia / psig		Set	Minimum Flowing Pressure	Formation Pres HP / RFT gau psia / psig	ıge	°C¯		Final Hydrost HP / RFT ga psia / psig		(include Probe type	
RFT TYPE			MPa/g	ppg		psia (Pretest)	MPa/g	ppg			MPa/g	ppg	L = Long nose probe M = Martineau probe	
1/19 Pretes		743.5	1380.80/1368 9.52	10.5		1084.91	1116.35/1105 7.70	8.8		19:30:00	1381.06/1368 9.52			L
1/20 Pretes		744.5	1382.53/1370 9.53		19:16:14	1096.49	1117.40/1106 7.70			19:19:29	1385.23/1373 9.55			L
1/21 Pretes		740.0	1376.98/1365 9.49	10.5	19:24:44	13.46			44.1	19:26:12	1376.51/1364 9.49			L
1/22 Pretes		736.5	1368.68/1357 9.44	10.5		17.88			44.1	19:32:26	1369.41/1356 9.44		_	L
1/23 Pretes		791.0	1464.21/1454 10.10			815.41	1185.94/1175 8.18	8.7		19:47:40	1466.40/1454			L
1/24 Pretes	758.0 t		1371.24/1358 9.45				1105.96/1095 7.63		44.6		1369.42/1357 9.44		Good perm.	L
2/25 Sample		791.8	/1458 10.05		23:11:20		/1177 8.12	8.7		23:22:34	/1457 10.05		Aborted Seal Failure.	M
2/26 Sample		791.0	/1456 10.04		23:25:36	•				23:27:00			No seal Aborted.	M
2/27 Sample		791.0	/1457 10.05		23:28:00	)				23:29:15			No seal Aborted.	M

GEOLOGIST/ENGINEER: LSG / RN

WELL: <u>LEATHERJACKET-1</u>
DATE: <u>28 FEBRUARY 1986</u>

RFT No Run/Se			pth m TVDSS KB=21	Initial Hydro HP / RFT ga psia / psig		Time Set	Minimum Flowing Pressure psia		ion Pres RFT gau psig		Temp °C	Time Retract		Hydrostatic RFT gauge psig	Comments (include Probe type  L = Long nose probe	
	RFT TYPE			MPa/g	ppg		(Pretest)	MPa/g		ppg			MPa/g	ррд	M = Martineau probe	
2/28	Sample	811.8	790.8		10.		5					23:33:37			No seal Aborted.	М
2/29	Sample	812.8	791.8	/1458 10.05		23:36:30 5	0					23:37:30			No seal Aborted.	M
2/30	Sample	812.7	791.7	/1458 10.05		23:41:3	8					23:42:46			No seal Aborted.	M
2/31	Test	818.2	797.2	/1468 10.12	10.	23:46:00	0					23:47:40			Checking packer seal - failed	M
2/32	Sample	813.0	792.0	/1459 10.06		23:56:2: 5	3 5.0		/1176 8.11	8.7		0:52:30		/1456 10.04 10.5		M
2/33	Sample	812.9	791.9		10.	0:55:3	0 39.0					0:57:30			Very tight Sample aborted.	М
2/34	Sample	812.7	791.7	/1456 10.04		1:00:0	0					1:01:45			Seal Failure Aborted	M
2/35	Sample	812.8	791.8	/1457 10.05		1:04:0	0 12.0					1:06:15			Very tight Aborted	M

GEOLOGIST/ENGINEER: LSG / RN

WELL: LEATHERJACKET-1
DATE: 28 FEBRUARY 1986

RFT N Run/S			epth m TVDSS KB=21		RFT gaug		Time Set	Minimum Flowing Pressure		ion Press RFT gau psig		Temp °C	Time Retract	Final Hydrostatic HP / RFT gauge psia / psig	(include Probe type	
	RFT TYPE			MPa/g		ppg		psia (Pretest)	MPa/g		ppg			MPa/g ppg	L = Long nose probe  M = Martineau probe	
2/36	Sample	812.1	791.1		/1455 10.03			5					1:10:45		No seal Aborted.	М
2/37	Sample	812.0	791.0		/1456 10.04			8							No seal Aborted.	
2/38	Sample	811.9	790.9		/1456 10.03			5							Seal failure Aborted.	M
2/39	Sample	811.5	790.5		/1455 9.45			0					1:21:30		No seal Aborted.	M
2/40	Sample				/1371.5 9.45		1:27:4	2					1:28:50		No seal Aborted.	M
3/41	Sample		744.4		/1370 9.45			6					4:22:19		No seal Sampling aborted.	
3/42	Sample	764.5	743.5		/1368 9.43	10.5		0 670.0		/1103 7.60	8.7		4:30:08	/1367 9.43 10	Seal lost 5 during sampling Aborted.	M
3/43	Sample	764.5	743.5		/1367 9.43			5					4:32:09		No seal Aborted.	

WELL: <u>LEATHERJACKET-1</u>

DATE: 28 FEBRUARY 1986

GEOLOGIST/ENGINEER: LSG / RN

RFT N Run/S		De m MDKB	epth m TVDSS KB=21	Initial Hydro HP / RFT ga psia / psig		Time Set	Minimum Flowing Pressure		ion Pres RFT gau psig		Temp °C	Time Retract	Final Hydr HP / RFT psia / psi	gauge	(include Probe type)	
	RFT TYPE			MPa/g	ppg		psia (Pretest)	MPa/g		ppg			MPa/g	ppg	L = Long nose probe M = Martineau probe	
3/44	Sample	764.7	743.7	/1367 9.43	10.		6 1019.0		/1141 7.87	9.0		4:38:28	/13 9.		achieved on	·е М
3/45	Reset	764.7	743.7	/1363 9.40	10.4	4:39:1 4	1					4:40:00			No seal.	M
3/46	Sample	765.0	744.0	/1368 9.43	10.	4:42:50 5	0 717.0		/1102 7.60	8.7	45.5	5:24:52	/13 9.			M

## RFT SAMPLE TEST REPORT

Well : LEATHERJACKET-1

OBSERVER : ECI/LSG

<u>DATE</u> : 28/2/86 <u>RUN NO.</u> : 1

	CHAMBER 1 (45	5.4 lit.)	CHAMBER 2 ( 10	.4 lit.)
SEAT NO.	1/16			
DEPTH	788.5	m		m
A. RECORDING TIMES Tool Set	17:52	hrs		hrs
Chamber Open	17:52	hrs		hrs
Chamber Full	18:51	hrs		hrs
Fill Time		mins		mins
Finish Build Up		hrs		hrs
Build Up Time		mins		mins
Tool Retract	18.53	hrs		hrs
Total Time		mins		mins
B. SAMPLE PRESSURE				
Initial Hydrostatic	1424.6	psia		psia
Initial Form'n Press.	1148.06	psia		psia psia
<u>Initial Flowing Press.</u>	20.00	psia		psia psia
Final Flowing Press.	32.2	psia psia		psia psia
Final Formation Press.	1146.6 1424.2	psia psia		psia
Final Hydrostatic	1424.2	psia		psia
C. TEMPERATURE  Max. Tool Depth	846.8	m		m
Max. Rec. Temp	47.1	deg C		deg C
Length of Circ.	47.1	hrs		hrs
Time/Date Circ. Stopped	22:30 hrs	27/02/86	hrs	/ /
Time since Circ.	19 hrs	22 mins		hrs
D. SAMPLE RECOVERY	<u> </u>			
Surface Pressure	0.0	psig		psig
Amt Gas	0.14			cu ft
Amt Oil	0.5	lit		lit
Amt Water (Total)	8.0	lit		lit
Amt Others	<u> </u>	lit		lit
E. SAMPLE PROPERTIES				
Gas Composition				
C1	TOO LITTLE TO	TEST ppm		ppm
C2		ppm		ppm
С3	<u> </u>	ppm		ppm
C4	<u> </u>	ppm		ppm
C5	1	ppm		ppm
C6+		ppm		ppm %/ppm
CO2/H2S	*26.5 deg API@	%/ppm	deg API@	deg C
Oil Properties Colour	HONEY - RUS		deg Ai 16	ues o
Fluorescence	PALE YELLOW			<del></del>
GOR	I TABLE TELLOW	WIITID		
Pour Point	10°C			
Water Properties				
Resistivity	1.16 ohm-m @	25 deg C	ohm-m @	deg C
NaCl Equivalent	4700	ppm		ppm
C1-titrated	4100	ppm		ppm
Tritium	368	DPM		DPM
рН	6.5			
Est. Water Type	FORMATION V	WATER		
F. MUD FILTRATE PROPERTIES				
Resistivity	0.318 ohm-m @	22 deg C	ohm-m @	deg C
NaCl Equivalent	20000	ppm		ppm
Cl-titrated	16000	ppm		ppm
pH	10.5	Dat		DDM
Tritium (in Mud)	2987	DPM		DPM
G. GENERAL CALIBRATION	10.5	~~~		224
Mud Weight	10.5	ppg		ppg 
Calc. Hydrostatic Serial No. (Preserved)	1412	psi	14-14-14-14-14-14-14-14-14-14-14-14-14-1	psi
Choke Size/Probe Type	.040" / L0	ONG NOSE		
	- SEALED CHAMBER			
* REFRACTOMETER HYDRO BUT WAX SOLIDS MAY	OMETER GAUGE 25 A HAVE SOME EFFECT	API @ 15.6 C	NOT OPENED	
•	HAVE SOME EFFECT		NOT OFENED	

# RFT SAMPLE TEST REPORT

<u>Well</u> : LEATHERJACKET-1

OBSERVER : LSG/RN DATE : 28/2/86 RUN NO. : 2

	CHAMBER 1 (45.	4 lit.)	CHAMBER 2 ( ]	0.4 lit.)
SEAT NO.	2/25			
DEPTH	812.8	m		m
A. RECORDING TIMES				1
Tool Set	23:11:20	hrs		hrs
Chamber Open	23:14:10	hrs		hrs hrs
Chamber Full	+ 23:19:30 + LOST SEAL	hrs   mins		mins
Fill Time   Finish Build Up	- + FO2T SEWE	hrs		hrs
Build Up Time	<u> </u>	mins		mins
Tool Retract	23:22:00	hrs		hrs
Total Time	11:00	mins		mins
B. SAMPLE PRESSURE				
Initial Hydrostatic	1458	psig		psia
Initial Form'n Press.	1177	psig		psia
Initial Flowing Press.	26	psig		psia
Final Flowing Press.	SEAL FAILURE	psig		psig
Final Formation Press.	11	psig	·	psig
Final Hydrostatic	li li	psig		psig
C. TEMPERATURE				
Max. Tool Depth	812.8	m L		m
Max. Rec. Temp	47.8	deg C		deg C
Length of Circ.		hrs		hrs
Time/Date Circ. Stopped		27/02/86	hrs	/ /
Time since Circ.	24 hrs	41 mins		hrs
D. SAMPLE RECOVERY				···
Surface Pressure	0.0	psig		psig
Amt Gas	0.31	cu ft		cu ft
Amt Oil	0.25	lit		<u>lit</u>
Amt Water (Total)	12.00	lit		lit
Amt Others		<u>lit</u>		<u>lit</u>
E. SAMPLE PROPERTIES	<del>,</del>			
Gas Composition	MOO GWALL TO WELL	avinn.		
C1	TOO SMALL TO MEA			ppm
C2 C3	<u> </u>	ppm		ppm
<u>C3</u>   C4	<u> </u>	ppm		ppm ppm
<u>C4</u>   C5	<u> </u>	ppm   ppm		ppm
	<u> </u>	ppm		ppm
CO2/H2S	<u> </u>	%/ppm		%/ppm
Oil Properties	* 15 deg API@ 1		deg API@	deg C
Colour	DARK BROWN	1		
Fluorescence	PALE YELLOW WH	ITE	<u></u>	
GOR				
Pour Point	less than 10°	C I		
Water Properties		1		
Resistivity	ohm-m@	deg C	ohm-m @	deg C
NaCl Equivalent		ppm		ppm
C1-titrated		ppm		ppm
Tritium		DPM		DPM
рН				
Est. Water Type	FILTRATE & DRILL	ING MUD		
F. MUD FILTRATE PROPERTIES				
Resistivity	0.318 ohm-m @	22 deg C	ohm-m @	deg C
NaCl Equivalent	28000	ppm		ppm
C1-titrated	17000	ppm		ppm
рН	10.5			
Tritium (in Mud)	2987	DPM		DPM
G. GENERAL CALIBRATION				
Mud Weight	10.5	ppg	·	ppg
Calc. Hydrostatic	1456	psi		psi
Serial No. (Preserved)				
Choke Size/Probe Type	.040"/MARTIN			
1	PLUGGING/SEAL FAIL	•	MOR ODDAID	
•	IN 45.4LT CHAMBER	. [	NOT OPENED	
	PACKER ON PROBE	!		
* REFRACTOMETE	Λ			

## RFT SAMPLE TEST REPORT

<u>Well</u> : LEATHERJACKET-1

OBSERVER : LSG/RN

<u>DATE</u> : 1/3/86 <u>RUN NO.</u> : 3

	<b>7</b> NO	CHAMBER 1 (45.	4 lit.)	CHAMBER 2 ( 10	.4 lit
	T NO.	3/46 765		3/46 765	m
DEP	RECORDING TIMES	700	m	703	
<u>4.</u>	Tool Set	4:42:50	hrs		hrs
	Chamber Open	4:44:04	hrs	5:15:0	hrs
	Chamber Open Chamber Full	5:06:30	hrs	5:21:06	hrs
	Fill Time	22:26	mins	6:06	min
	Finish Build Up	5:14:30	hrs	5:22:24	hrs
	Build Up Time	8:00	mins	1:18	min
	Tool Retract		hrs	5:23:06	hrs
	Total Time		mins	40:06	min
В.	SAMPLE PRESSURE				
	Initial Hydrostatic	1368	psig	1368	psi
	Initial Form'n Press.	1102	psig	1110	psi
	Initial Flowing Press.	90	psig	100	psi
	Final Flowing Press.	1110	psig	1100	psi
	Final Formation Press.	1100	psig	1100	psi
	Final Hydrostatic		psig	1367	psi
3.	TEMPERATURE				
	Max. Tool Depth	765.0	m	765.0	m
	Max. Rec. Temp	45.5	deg C	45.5	deg
	Length of Circ.		hrs		hrs
	Time/Date Circ. Stopped		27/02/86	hrs	_/_/
	Time since Circ.	30 hrs	13 mins		hrs
).	SAMPLE RECOVERY		L		
	Surface Pressure	<sup>•</sup> 150	psig	PRESERVED	psig
	Amt Gas	7.7	cu ft	11	cu f
	Amt Oil	26.0	lit	11	lit
	Amt Water (Total)	17.0	lit		lit
	Amt Others		lit	11	lit
Ξ.	SAMPLE PROPERTIES				
	Gas Composition		1		
	C1	143503	ppm		ppm
	C2	2692	ppm	11	ppm
	C3	356	ppm	11	ppm
	C4	1011	ppm	II .	ppm
	C5	725	ppm	11	ppm
	C6+	79	ppm	11	ppm
	CO2/H2S	-/-	%/ppm		%/pp
<u> </u>	Properties	24.4 deg API@ 1		deg API@	deg
	Colour	RUST BROW			
	Fluorescence	PALE YELLOW	WHITE		
	GOR	47.1			
	Pour Point	10°C			
Vat	er Properties				
	Resistivity	ohm-m @	deg C	ohm-m @	deg C
	NaCl Equivalent	? MUD FILTRAT			ppm
	C1-titrated	SEE NOTE	ppm		ppm
	Tritium		DPM		DPM
	pH	ICIN A PET TO A	_ <del></del>		
	Est. Water Type	MUD & FILTRATE	<u> </u>		
· .	MUD FILTRATE PROPERTIES	0.010 1 0	22 1 2	- h ··· · · ·	مداهد
	Resistivity	0.318 ohm-m @	22 deg C	ohm-m @	deg
	NaCl Equivalent	28000	ppm		ppm
	Cl-titrated	14500	ppm		ppm
	pH	10.5	- Date		DDM
	Tritium (in Mud)	2987	DPM		DPM
3.	GENERAL CALIBRATION		!		
	Mud Weight	10.5	ppg		ppg
	Calc. Hydrostatic	1370	psi	DEC 40 1011	psi
	Serial No. (Preserved)	0.011 /254 507	TAU !	RFS-AE 1211	
	Choke Size/Probe Type	.040"/MARTIN		10.4 LT CHAMBER	
	A 2 2 4 7 1	- BAN GEAL EATERDE	I IAA IAI	III A IT CHAMKER	
REM.	ukko i	HAD SEAL FAILURE EARLY TEST - 17.	•	PRESERVED.	

APPENDIX 5

# ESSO AUSTRALIA LTD GEOGRAM PROCESSING REPORT

## LEATHERJACKET - 1

FIELD : WILDCAT

STATE : VICTORIA

COUNTRY : AUSTRALIA

LOCATION : GIPPSLAND BASIN

COORDINATES : 038° 05' 16.85" S 148° 46' 41.82" E

DATE OF SURVEY : 1-MARCH-1986

REFERENCE NO. : 560306

## CONTENTS

- I Introduction
- 2 Data Acquisition
- 3 Check Shot Data
- 1 Sonic Calibration
- 5 Sonic Calibration Processing
- GEOGRAM Processing
- 7 Summary of Geophysical Listings

Fig. 1: Wavelet polarity convention

Fig. 2: Gun geometry sketch

Well Seismic Service Computation Request

Well Seismic Service Field Report

Geophysical Airgun Report
Drift Computation Report
Sonic Adjustment Parameter Report
Velocity Report
Time Converted Velocity Report
Synthetic Seismogram Table

## 1.0 INTRODUCTION

A velocity check shot survey was conducted in the Leatherjacket - 1 well on 1 March 1986. Six levels from 620 metres to 951 metres below DF were shot using a airgun source. All levels have been used in the calibration of the sonic log.

The shot times and calibrated sonic times have been corrected to the seismic reference datum at mean sea level.

## 2.0 DATA ACQUISITION

Table 1 Field Equipment and Survey Parameters

0.0 metres AMSL
21.0 metres AMSL
20.7 metres AMSL
-106.0 metres AMSL
6
'Nil
951 metres below DF
Airgun, 120 cu inches
40.0 metres
9.1 metres below MSL
50°
- Accelerometer
40.0 metres
9.1 metres below MSL
50°
Geospace HS-1
High Temp. $(350^{\circ}F)$
Coil Resist. $225\Omega \pm 10\%$
Natural Freq. 8-12 hertz
Sensitivity 0.45 V/in/sec
Maximum tilt angle 60°

Recording was made on the Schlumberger Cyber Service Unit (CSU) using LIS format.

#### 2.1 Survey Details

The survey was shot using a airgun source and accelerometer as the surface sensor. A moonpool hydrophone was recorded for calculating the source offset. No major problems were noted during the survey.

## 3.0 CHECK SHOT DATA

A total of 6 check levels were shot during the survey. The level at 620 metres below DF was shot going into and coming out of the well. The transit times from both sets of data are identical.

The data quality is good and a plot of the stacked check shot data is displayed at plot 3 of the 'Raw and Stacked Checkshot Data'.

Table 2 Checkshot levels

Level Depth (metres below DF )	Stacked Shots	Rejected Shots	Quality	Comments
620	5	0	Good	Shot going down
	5	0	Good	
745	5	0	Good	
811	4	1	Good	•
857	4	4.	Good	
951	6	4	Good	

#### 4.0 SONIC CALIBRATION

A 'drift' curve is obtained using the sonic log and the vertical check level times. The term 'drift' is defined as the seismic time (from check shots) minus the sonic time (from integration of edited sonic). Commonly the word 'drift' is used to identify the above difference, or to identify the gradient of drift verses increasing depth, or to identify a difference of drift between two levels.

The gradient of drift, that is the slope of the drift curve, can be negative or positive.

For a negative drift  $\frac{\Delta drift}{\Delta depth} < 0$ , the sonic time is greater than the seismic time over a certain section of the log.

For a positive drift  $\frac{\Delta drift}{\Delta depth} > 0$ , the sonic time is less than the seismic time over a certain section of the log.

The drift curve, between two levels, is then an indication of the error on the integrated sonic or an indication of the amount of correction required on the sonic to have the TTI of the corrected sonic match the check shot times.

Two methods of correction to the sonic log are used.

- 1. Uniform or block shift This method applies a uniform correction to all the sonic values over the interval. This uniform correction is applied in the case of positive drift and is the average correction represented by the drift curve gradient expressed in  $\mu sec/m$ .
- 2.  $\Delta T$  Minimum In the case of negative drift a second method is used, called  $\Delta t$  minimum. This applies a differential correction to the sonic log, where it is assumed that the greatest amount of transit time error is caused by the lower velocity sections of the log. Over a given interval the method will correct only  $\Delta t$  values which are higher than a threshold, the  $\Delta t_{min}$ . Values of  $\Delta t$  which are lower than the threshold are not corrected. The correction is a reduction of the excess of  $\Delta t$  over  $\Delta t_{min}$ ,  $\Delta t$   $\Delta t_{min}$ .

 $\Delta t - \Delta t_{min}$  is reduced through multiplication by a reduction coefficient which remains constant over the interval. This reduction coefficient, named G, can be be defined as:

$$G = 1 + \frac{drift}{\int (\Delta t - \Delta t_{min})dZ}$$

Where drift is the drift over the interval to be corrected and the value  $\int (\Delta t - \Delta t_{min}) dZ$  is the time difference between the integrals of the two curves  $\Delta t$  and  $\Delta t_{min}$ , only over the intervals where  $\Delta t > \Delta t_{min}$ .

Hence the corrected sonic:  $\Delta t = G(\Delta t - \Delta t_{min}) + \Delta t_{min}$ .

## 5.0 SONIC CALIBRATION PROCESSING

#### 5.1 Open Hole Logs

Both the sonic and density logs used have been edited prior to input into the Well Scismic Calibration processing chain.

The top and bottom checkshots at 620 and 951 metres respectively are outside of the logged interval. Both the sonic and density have been extrapolated at constant values to these levels. The overall log quality is good and only minor zones of cycle skipping have been edited from the sonic log.

Density log interval : 626 to 9: Sonic log interval : 640 to 9:

626 to 925 metres below DF

.

640 to 945 metres below DF

#### 5.2 Source Offset

The moonpool hydrophone was used to determine the airgun offset. An average transit time of 27 millisecs was measured between the airgun and the moonpool hydrophone. Using this time and a water velocity of 1480 metres/sec an offset of 39.9 metres was calculated. The moonpool hydrophone was positioned 14.5 feet from the wellhead at right angles to the airgun. An offset distance of 40 metres has been used.

#### 5.3 Correction to Datum

Seismic reference datum (SRD) is at mean sea level. The airgun source was positioned 9.1 metres below MSL. Using a water velocity of 1480 metres/sec a correction of -6.15 millises has been applied vertically between gun and datum.

#### 5.4 Imposed Shots and Velocity Modelling

An imposed shot at the sea floor has been used in addition to the checkshot data to calibrate the sonic log. The transit time has been calculated assuming a water velocity of 1480 metres/sec. The checkshot at the top of the sonic is of good quality and has been used in the sonic calibration.

The velocity model used is diplayed below. Depths stated are referenced to metres below derrick floor and metres below SRD respectively.

SRD		20.7 / 0 metres
	1480 metres/sec	
Sea floor		126.7 / 106 metres
	2032 metres/sec	
Top of sonic		620 / 599.3 metres

#### 5.5 Sonic Calibration Results

The top of the sonic log (620 metres below DF) is chosen as the origin for the calibration drift curve. The drift curve indicates a number of corrections to be made to the sonic log. A list of shifts used on the sonic data is given below.

Table 3 Sonic Drift

Depth Interval (metres below DF )	Block Shift µsec/m	Δt <sub>min</sub> μsec/m	Equiv Block Shift µsec/m
126.7-620.0	0.0	<b>a</b>	0.0
<b>620.0-951.0</b>	13.9	-	13.9

The adjusted sonic curve is considered to be the best result using the available data.

## **6.0 GEOGRAM PROCESSING**

GEOGRAM plots were generated using 20, 25, 30 and 35 hertz ricker wavelets The presentations include both normal and reverse polarity on a time scale of 3.75 in/sec.

GEOGRAM processing produces synthetic seismic traces based on reflection coefficients generated from sonic and density measurements in the well-bore. The steps in the processing chain are the following:

Depth to time conversion

Reflection coefficients

Attenuation coefficients

Convolution

Output.

#### 6.1 Depth to Time Conversion

Open hole logs are recorded from the bottom to top with a depth index. This data is converted to a two-way time index and flipped to read from the top to bottom in order to match the seismic section.

## 6.2 Primary Reflection Coefficients

Sonic and density data are averaged over chosen time intervals (normally 2 or 4 millisecs). Reflection coefficients are then computed using:

$$R = \frac{\rho_2 . \nu_2 - \rho_1 . \nu_1}{\rho_2 . \nu_2 + \rho_1 . \nu_1}$$

where

 $\rho_1 = \text{density of the layer above the reflection interface}$   $\rho_2 = \text{density of the layer below the reflection interface}$   $\nu_1 = \text{compressional wave velocity of the layer above}$ 

the reflection interface

 $u_2$  = compressional wave velocity of the layer below the reflection interface

This computation is done for each time interval to generate a set of primer

This computation is done for each time interval to generate a set of primary reflection coefficients without transmission losses.

#### 6.3 Primaries with Transmission Loss

Transmission loss on two-way attenuation coefficients are computed using:

$$A_n = (1 - R_1^2).(1 - R_2^2).(1 - R_3^2)...(1 - R_n^2)$$

A set of primary reflection coefficients with transmission loss is generated using:

$$Primary_n = R_n.A_{n-1}$$

#### 6.4 Primaries plus Nuttiples

Multiples are computed from these input reflection coefficients using the transform technique from the top of the well to obtain the impulse response of the earth. The transform outputs primaries plus multiples.

## 6.5 Multiples Only

By subtracting previously calculated primaries from the above result we obtain multiples only.

#### 6.6 Wavelet

A theoretical wavelet is chosen to use for convolution with the reflection coefficients previously generated. Choices available include:

Klauder wavelet

Ricker zero phase wavelet

Ricker minimum phase wavelet

Butterworth wavelet

User defined wavelet.

Time variant butterworth filtering can be applied after convolution. Polarity conventions are shown in Figure 1. These GEOGRAMS were generated using zero and minimum phase ricker wavelets.

## 6.7 Convolution

Standard procedure of convolution of wavelet with reflection coefficients. The output is the synthetic seismogram.

## 7.0 SUMMARY OF GEOPHYSICAL LISTINGS

Six geophysical data listings are appended to this report. Following is a brief description of the format of each listing.

## 7.1 Geophysical Airgun Report

- 1. Level number: the level number starting from the top level (includes any imposed shots).
- 2. Vertical depth from DF: dkb, the depth in metres from derrick floor.
- 3. Vertical depth from SRD: dsrd, the depth in metres from seismic reference datum.
- 4. Vertical depth from GL: dgl, the depth in metres from ground level.
- 5. Observed travel time HYD to GEO: tim0, the transit time picked from the stacked data by subtracting the surface sensor first break time from the downhole sensor first break time.
- 6. Vertical travel time SRC to GEO: timv, is corrected for source to hydrophone distance and for source offset.
- 7. Vertical travel time SRD to GEO: shtm, is time corrected for the vertical distance between source and datum.
- 8. Average velocity SRD to GEO: the average seismic velocity from datum to the corresponding checkshot level,  $\frac{derd}{whtm}$ .
- 9. Delta depth between shots :  $\Delta depth$ , the vertical distance between each level.
- 10. Delta time between shots: Δtime, the difference in vertical travel time (shtm) between each level.
- 11. Interval velocity between shots: the average seismic velocity between each level,  $\frac{\Delta depth}{\Delta time}$

#### 7.2 Drift Computation Report

- 1. Level number: the level number starting from the top level (includes any imposed shots).
- 2. Vertical depth from DF: the depth in metres from derrick floor.
- 3. Vertical depth from SRD: the depth in metres from seismic reference datum.
- 4. Vertical depth from GL: the depth in metres from ground level.
- 5. Vertical travel time SRD to GEO: the calculated vertical travel time from datum to downhole geophone (see column 7, Geophysical Airgun Report).
- 6. Integrated raw sonic time: the raw sonic log is integrated from top to bottom and listed at each level. An initial value at the top of the sonic log is set equal to the checkshot time at that level. This may be an imposed shot if a shot was not taken at the top of the sonic.
- 7. Computed drift at level: the checkshot time minus the integrated raw sonic time.
- 8. Computed blk-shft correction: the drift gradient between any two checkshot levels  $(\frac{\Delta drift}{\Delta depth})$ .

#### 7.3 Sonic Adjustment Parameter Report

- 1. Knee number: the knee number starting from the highest knee. (The first knees listed will generally be at SRD and the top of sonic. The drift imposed at these knees will normally be zero.)
- 2. Vertical depth from DF: the depth in metres from derrick floor.
- 3. Vertical depth from SRD: the depth in metres from seismic reference datum.
- 4. Vertical depth from GL: the depth in metres from ground level.
- 5. Drift at knee: the value of drift imposed at each knee.
- 6. Blockshift used: the change in drift divided by the change in depth between any two levels.
- 7. Delta-T minimum used: see section 4 of report for an explanation of  $\Delta t_{min}$ .
- 8. Reduction factor: see section 4 of report.
- 9. Equivalent blockshift: the gradient of the imposed drift curve.

#### 7.4 Velocity Report

- 1. Level number: the level number starting from the top level (includes any imposed shots).
- 2. Vertical depth from DF: the depth in metres from derrick floor.
- 3. Vertical depth from SRD: the depth in metres from seismic reference datum
- 4. Vertical depth from GL: the depth in metres from ground level
- 5. Vertical travel time SRD to GEOPH: the vertical travel time from SRD to downhole geophone (see column 7, Geophysical Airgun Report)
- 6. Integrated adjusted sonic time: the adjusted sonic log is integrated from top to bottom. An initial value at the top of the sonic is set equal the checkshot time at that level. (The adjusted sonic log is the drift corrected sonic log.)
- 7. Drift=shot time-raw son: the check shot time minus the raw integrated sonic time.
- 8. Residual=shot time-adj son: the check shot time minus the adjusted integrated sonic time. This is the difference between calculated drift and the imposed drift.
- 9. Adjusted interval velocity: the interval velocity calculated from the integrated adjusted sonic time at each level.

## 7.5 Time Converted Velocity Report

The data in this listing has been resampled in time.

- 1. Two way travel time from SRD: This is the index for the data in this listing. The first value is at SRD (0 millisecs) and the sampling rate is 2 millisecs.
- 2. Measured depth from DF : the depth from DF at each corresponding value of two way time.
- 3. Vertical depth from SRD: the vertical depth from SRD at each corresponding value of two way time.
- 4. Average velocity SRI) to GEO: the vertical depth from SRD divided by half the two way time.
- 5. RMS velocity: the root mean square velocity from datum to the corresponding value of two way time.

$$v_{rms} = \sum_{i=1}^{n} v_i^2 t_i / \sum_{i=1}^{n} t_i$$

where  $v_i$  is the velocity between each 2 millisecs interval.

- 6. First normal moveout: the correction time in millisecs to be applied to the two way travel time for a specified moveout distance (default = 3000 feet).
- 7. Second normal moveout: the correction time in millisecs to be applied to the two way travel time for a specified moveout distance (default = 4500 feet).
- 8. Third normal moveout: the correction time in millisecs to be applied to the two way travel time for a specified moveout distance (default = 6000 feet).
- 9. Interval velocity: the velocity between each sampled depth. Typically, the sampling rate is 2 millisecs two way time, (1 millisec one way time) therefore the interval velocity will be equal to the depth increment divided by 0.001. It is equivalent to column 9 from the the Velocity Report.

## 7.6 Synthetic Seismogram Table

- 1. Two way travel time from SRD: This is the index for the data in this listing. The first value is at the top of the sonic. The default sampling rate is 2 millisecs.
- 2. Vertical depth from SRD: the vertical depth from SRD at each corresponding value of two way time.
- 3. Interval velocity: the velocity between each sampled depth. Typically, the sampling rate is 2 millisecs two way time, (1 millisec one way time) therefore the interval velocity will be equal to the depth increment divided by 0.001. It is equivalent to column 9 from the the Velocity Report.
- 4. Interval density: the average density between two successive values of two way time.
- 5. Reflect. coeff.: the difference in acoustic impedance divided by the sum of the acoustic impedance between any two levels. The acoustic impedance is the product of the interval density and the interval velocity.
- 6. Two way atten. coeff.: is computed from the series

$$A_n = (1 - R_1^2).(1 - R_2^2).(1 - R_3^2)...(1 - R_n^2)$$

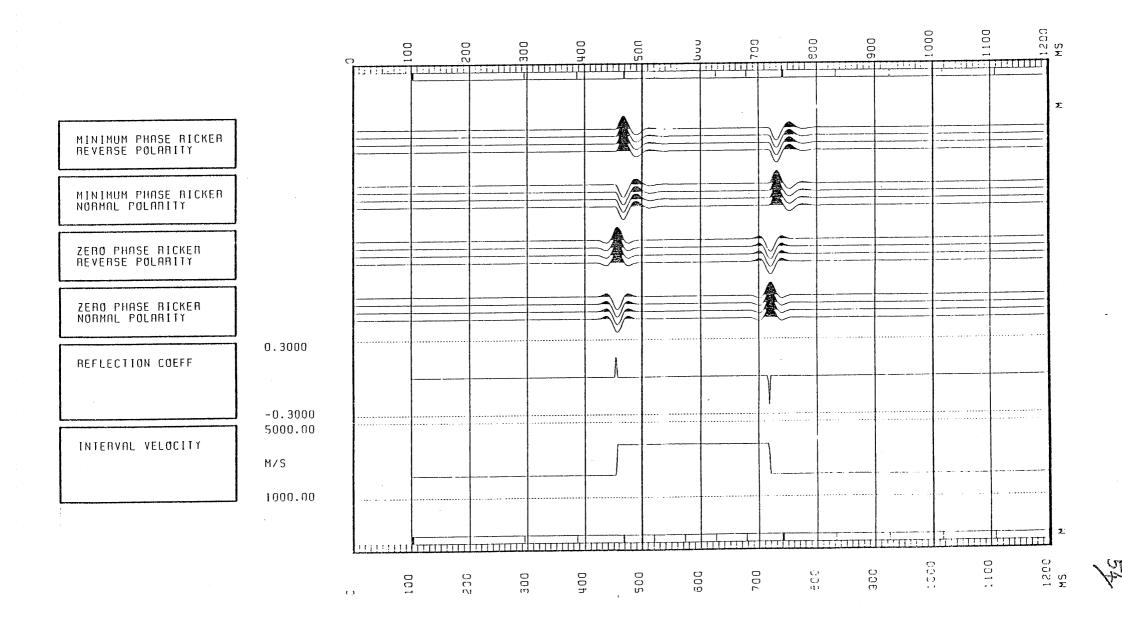
7. Sythetic seismo, primary: the product of the reflection coefficient at each depth and the two way attenuation coefficient up to that depth.

$$Primary_n = R_n.A_{n-1}$$

- 8. Primary + multiple: a transform technique is used to calculate multiples from the input reflection coefficients.
- 9. Multiples only: (I'rim:ry + multiple) (Synthetic seismo. primary)

## SCHLUMBERGER (SEG-1976) WAVELET POLARITY CONVENTION

Figure 1



## **GUN GEOMETRY SKETCH**

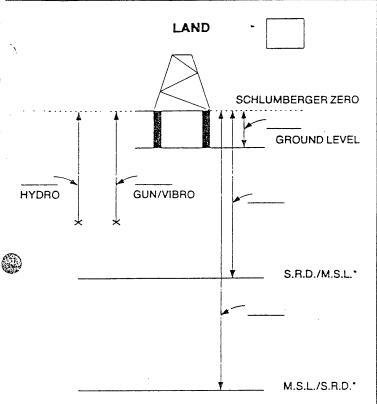
Figure 2.

Schlumberger

CLIENT: ESSO AUSTRALIA LTD

WELL: LEATHERJACKET-1

DATE: 1/3/86



SCHLUMBERGER ZERO

SCHLUMBERGER ZERO

20.7m
M.S.L.

29.8m
GUN & ACCEL
HYDRO

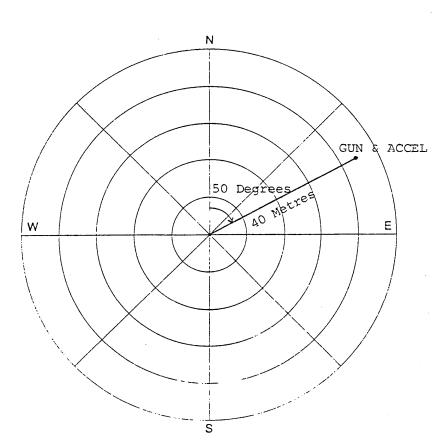
GROUND LEVEL

S.R.D.
(IF NOT M.S.L. OR
GROUND LEVEL)

INDICATE ALL DISTANCES RELATIVE TO SCHLUMBERGER ZERO

\* DELETE AS APPLICABLE

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	4				
	5				
4	6				
1	7				



INDICATE ALL DISTANCES RELATIVE

TO SCHLUMBERGER ZERO

INDICATE GUN/VIBRO AND HYDROPHONE OFFSET AND AZIMUTH RELATIVE TO NORTH

E	56	•

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FIELD/COUNTRY: WILDCA LOCATION/DIVISION: VE	A/ANZ		WSC	6	1	6	#2
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DATE SENT:RA	MIAH			6	1	6	
			VSP				
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FINAL GEOGRAM PARAME  (ONE GEOGRAM INCLUDE: FOR EACH OF, PRIMARIES PRIMARIES WITH TRANSM FOR THE CHOSEN WAVEL  DIP OPTION SEISMIC LINE NUMBER (ENCLOSE WELL LOCATION DISTANCE BETWEEN TRACE SECTION PERSPECTIVE: SECTIO	S DISPLAYS IN BO  S, PRIMARIES + MI  SISSION LOSS, MU  LET AND T.V.F.)  YES   ON MAP VERSUS SI  CES  FROM A  FROM B  R TESTS WILL BE SI  ACES IN WINDOW  F) TO BE APPLIED	RE FINALIZATION ( DTH POLARITIES   ULTIPLES,   ILTIPLES ONLY   NO	(8 BAND WIDT  WAVELET  WAVELET  WAVELET  WAVELET  WAVELET  WAVELET  SCALET  SCALE  SCALE  SEISMIC PR  ALLY  3	FRECUE DI 20,2 DI 30,3 DIS 10 CM/SE OFILE	T. T.LOW  V. 5  F. C+ ONE OTHER  C+ ONE OTHER  CC+ CLO  CLL  A  URGER	T.HIGH F.LO  R-SPECIFY [  CKWISE)  NT? YES   9	NO [

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COMPANY : ESSO AU	STRALIA L	.TD	WE	LL :	LEATHERJA	CKET - 1		PA	GE 3
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This is an enclosure indicator page. The enclosure PE603536 is enclosed within the container PE906161 at this location in this document.

The enclosure PE603536 has the following characteristics:

ITEM\_BARCODE = PE603536
CONTAINER\_BARCODE = PE906161

NAME = Seismic Calibration Log

BASIN = GIPPSLAND PERMIT = VIC/P19 TYPE = WELL

SUBTYPE = VELOCITY\_CHART

Leatherjacket-1.

REMARKS =

DATE\_CREATED = 13/03/1986 DATE\_RECEIVED = 13/08/1986

 $W_NO = W928$ 

WELL\_NAME = LEATHERJACKET-1 CONTRACTOR = SCHLUMBERGER

CLIENT\_OP\_CO = ESSO AUSTRALIA LIMITED

This is an enclosure indicator page.

The enclosure PE603537 is enclosed within the container PE906161 at this location in this document.

The enclosure PE603537 has the following characteristics:

ITEM\_BARCODE = PE603537
CONTAINER\_BARCODE = PE906161

NAME = Synthetic Seismogram

BASIN = GIPPSLAND PERMIT = VIC/P19

TYPE = WELL

SUBTYPE = SYNTH\_SEISMOGRAPH

REMARKS =

DATE\_CREATED = 13/03/1986 DATE\_RECEIVED = 13/08/1986

 $W_NO = W928$ 

WELL\_NAME = LEATHERJACKET-1 CONTRACTOR = SCHLUMBERGER

CLIENT\_OP\_CO = ESSO AUSTRALIA LIMITED

This is an enclosure indicator page.

The enclosure PE906164 is enclosed within the container PE906161 at this location in this document.

The enclosure PE906164 has the following characteristics:

ITEM\_BARCODE = PE906164
CONTAINER\_BARCODE = PE906161

NAME = Raw and Stacked Checkshot Data

BASIN = GIPPSLAND PERMIT = VIC/P19

TYPE = WELL SUBTYPE = VELOCITY\_CHART

DESCRIPTION = Raw and Stacked Checkshot Data for

Leatherjacket-1

REMARKS =

DATE\_CREATED = 13/03/1986 DATE\_RECEIVED = 13/08/1986

 $W_NO = W928$ 

WELL\_NAME = LEATHERJACKET-1
CONTRACTOR = SCHLUMBERGER

CLIENT\_OP\_CO = ESSO AUSTRALIA LIMITED

This is an enclosure indicator page. The enclosure PE906162 is enclosed within the container PE906161 at this location in this document.

The enclosure PE906162 has the following characteristics:

ITEM\_BARCODE = PE906162
CONTAINER\_BARCODE = PE906161

NAME = Time-Depth Curve

BASIN = GIPPSLAND PERMIT = VIC/P19

TYPE = WELL

SUBTYPE = VELOCITY\_CHART

DESCRIPTION = Time-Depth Curve for Leatherjacket-1

REMARKS =

DATE\_CREATED = 10/04/1986 DATE\_RECEIVED = 13/08/1986

 $W_NO = W928$ 

WELL\_NAME = LEATHERJACKET-1

CONTRACTOR =

CLIENT\_OP\_CO = ESSO AUSTRALIA LIMITED