



Enclosure 4~~0~~

Time-depth curve is
missing from this
report.

A REPORT TO ESSO AUSTRALIA LTD. ON THE SEM ANALYSIS OF TWO
CHIP SAMPLES OF WAARRE FORMATION FROM TRITON-1,
OTWAY BASIN.

IAN R. DUDDY

SAMPLES:

Two small chips of sandstone from caved cuttings of probable Waarre Formation (3400m - 3545 m T.D.) were supplied by ESSO for Scanning Electron Microscope (SEM) analysis

PREPARATION:

1. A thin section was prepared from a small portion of one chip.
2. The remaining samples were broken and two SEM mounts were prepared with fresh internal surfaces for analysis.
3. The mounts were then carbon coated for electron conduction.

RESULTS:

Thin section observations: Visual estimates of the detrital components in the thin sectioned sample are given below-

Quartz	----	50%
Labile rock fragments- mainly argillaceous sediment	----	40%
Plagioclase, muscovite accessories and clay mineral cement	----	10%

No definite depositional matrix is present but compaction by squashing of labile rock fragments is extreme, and this would appear to be a major factor in porosity reduction (Plate 1). A clay mineral cement is present in the reduced pores and there are some quartz overgrowths. The clay mineral cement is very difficult to distinguish from the mechanically deformed rock fragments in thin section.

SEM Analysis:

No significant differences were noted in the two chips so the comments

below apply to both samples.

The SEM revealed the presence of an **extensive grain coating illite** cement which at least partly fills remaining porosity (Plate 2). The illite occurs in various forms including delicate filmy flakes (Plate 3) and well crystallized euhedra (Plate 4). EDAX (energy dispersive X-ray analyser) confirmed that the illite was an Fe containing variety.

Well-crystallized kaolinite was observed in pore spaces (Plate 5) but it is of minor importance compared with the illite.

Quartz overgrowths are present but these are not responsible for significant porosity reduction (Plate 6).

A small amount of secondary **siderite** and possible **authigenic albite** and **K-feldspar** were also noted, as was evidence for infiltration of **KCl drilling mud**.

CONCLUSIONS:

The primary cause of porosity occlusion in this sample appears to have been mechanical compaction of the abundant unstable argillaceous rock fragments.

Most of the small amount of porosity remaining is occluded by, in order of decreasing importance, illite grain coating cement, kaolinite pore fills, quartz overgrowths. The illite cement would mean an effective permeability close to zero.

It is not possible to give any firm opinion on the timing of diagenetic alteration after examination of two samples, but similar alterations seen by the author at the top of the underlying Otway Formation in other wells, suggests the formation of illite early in the burial history.

PLATES

PLATE 1: Thin section photomicrograph showing abundant compacted argillaceous rock fragments. Note the mechanically deformed muscovite grains. Width of field of view is 2.2 mm.

PLATE 2: SEM photograph showing illite grain coating and pore filling cement (x 1000).

PLATE 3: SEM photograph with filmy illite grain coatings and possible authigenic K-feldspar in pore (x 1220).

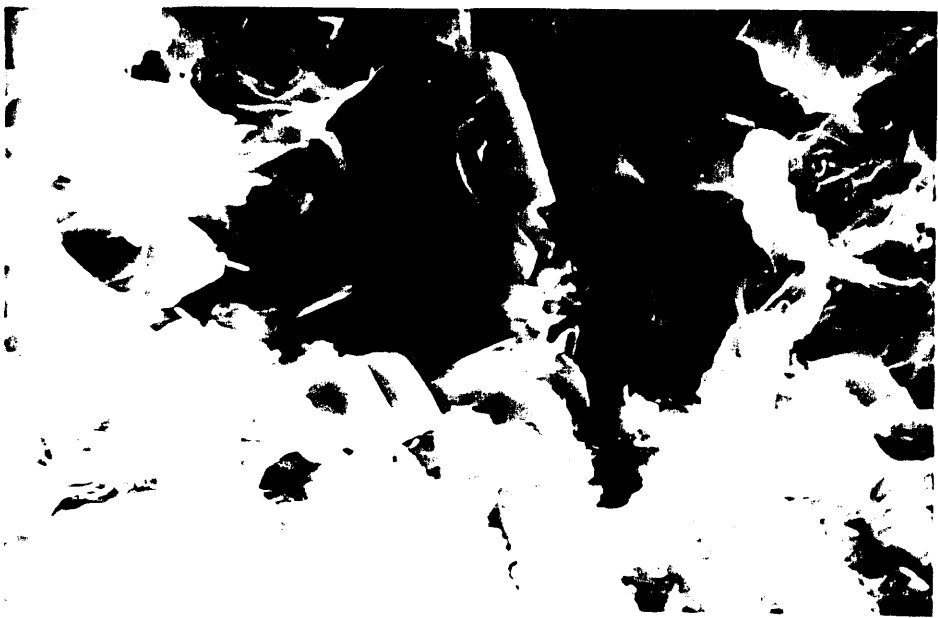
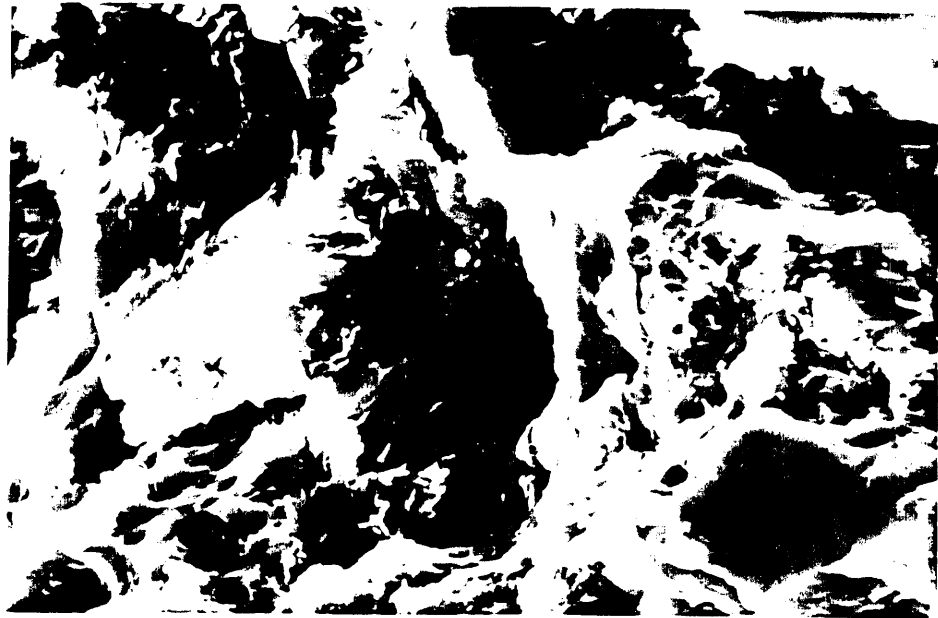
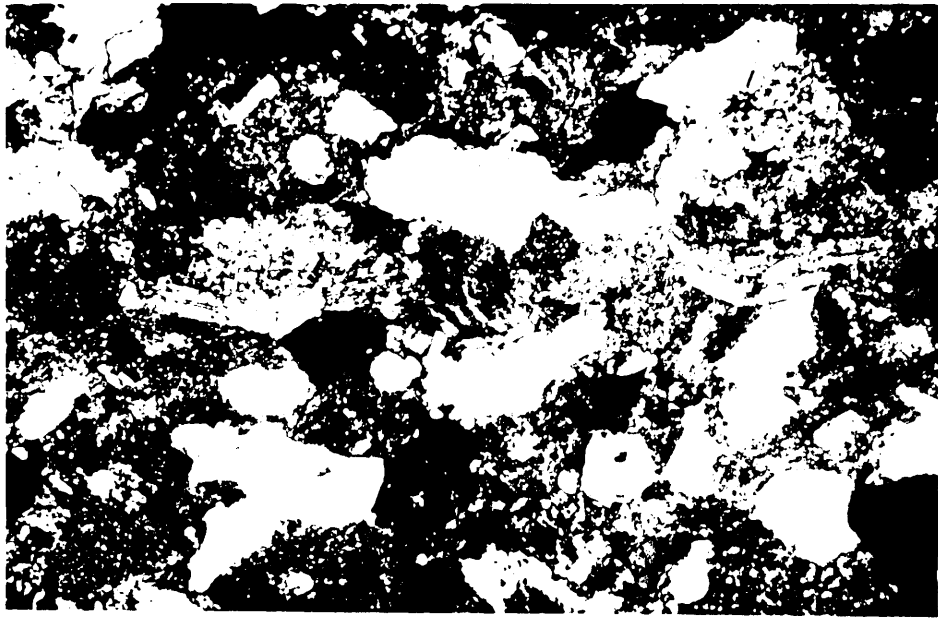
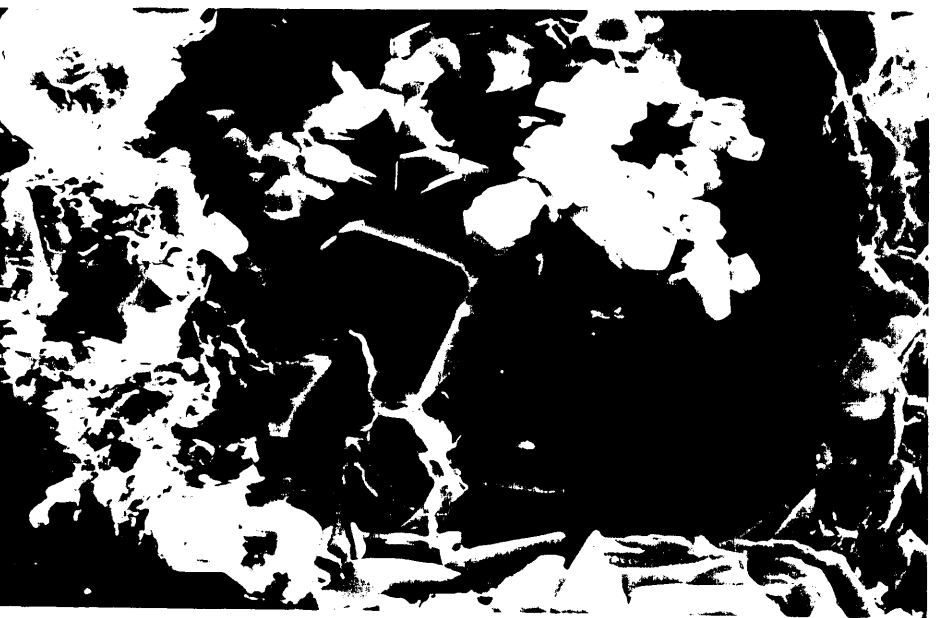


PLATE 4: SEM photograph of well crystallized illite in pore (x 1000)

PLATE 5: SEM photograph showing detail of well-crystallized kaolinite in another pore (x 800)

PLATE 6: SEM photograph showing quartz overgrowths and well-crystallized kaolinite in pore. Note also filmy illite. (x 550)



APPENDIX 10

OIL and GAS DIVISION

28 OCT 1982

APPENDIX 10

VELOCITY SURVEY REPORT

TRITON#1 AND TRITON#1 SIDETRACK

OTWAY BASIN

MARINE VELOCITY SURVEY

Well Triton #1
Basin Otway

INTRODUCTION

Eso Personnel M. Taylor
Contractor Velocity Data Pty. Ltd

Supplied (1) Instruments.
(2) Personnel

Seismic Observer..... J. Larsen
Marine Shooter M. O'Driscoll
Navigation..... N/A

(3) Licenced Shooting Boat

Name..... N/A
Date Loaded.....
Date Released.....
Agent.....

(4) Seismic Source

Gas Gun

Gas Pressures..... 20 sec fill
Oxygen..... 90 psi
Propane..... 45 psi

Personnel and Instruments

assembled at Warrnambool Date 22.3.82
Boarded (rig) Southern Cross Date 23.3.82
Date of survey 23.3.82
Casing Depth 2810m RKB
.....
T.D. when shot 2785m RKB
water depth 100 metres

SURVEY PROCEDURE

Weather: Wind 20 knots south
Swell 15' SW
Sea Moderate
Rig Movement ... Moderate
Rig Noise Moderate to High

Hydrophones: Number.....Two.....
 Depth below sea level9.14.....metres
 Position ...One at top of gun and one.....
 in moonpool.....
 Gas Gun: number of shots per level
 gun depth12.2.....metres
 Well phone positioning:
 No of depths13.....
 Time: first shot2137 23.3.82.....
 last shot0223 24.3.82.....
 Total rig time5 hours.....

RESULTS

Quality of results (good1.....
 (fair17.....
 (poor19.....
 (not used5.....

Comparison of Interval Times with Sonic Log

/ / average24.4.....microsec/metre
 / / max113.6.....microsec/metre

CONCLUSION

Reliability of T-D curveGood.....

COMMENTS

MARINE VELOCITY SURVEY

Well Triton #1

Basin Otway

INTRODUCTION

Esso Personnel .. S. Twartz

Contractor Velocity Data Pty Ltd

Supplied (1) Instruments.
(2) Personnel

Seismic Observer..... J Larsen

Marine Shooter M O'Driscoll

Navigation..... N/A

(3) Licenced Shooting Boat

Name..... N/A

Date Loaded.....

Date Released.....

Agent.....

(4) Seismic Source

Gas Gun

Gas Pressures..... 20 sec fill

Oxygen..... 90psi

Propane..... 45psi

Personnel and Instruments

assembled at WarrnamboolDate 17.4.82

Boarded (rig) Southern CrossDate 18.4.82

Date of survey 20.4.82

Casing Depth 20" @ 240m

..... 13 3/8" @ 1042m 9 5/8" @ 2811m RKB

T.D. when shot 3545m RKB

water depth 100metres

SURVEY PROCEDURE

Weather: Wind Light - moderate

Swell light

Sea moderate

Rig Movement moderate

Rig Noise low

Hydrophones: Number...Two.....
 Depth below sea level9.14.....metres
 Position ..One.at.top.of.gun.....
 ..and.one.in.moonpool.....

Gas Gun: number of shots per level ..2/3.....
 gun depth12.2.....metres

Well phone positioning:
 No of depths12.....

Time: first shot0500.....
 last shot0819.....
 Total rig time4 hours.....

RESULTS

Quality of results (good3.....
 (fair21.....
 (poor11.....
 (not used2.....

Comparison of Interval Times with Sonic Log
 / / average24.4.....microsec/metre
 / / max113.6.....microsec/metre

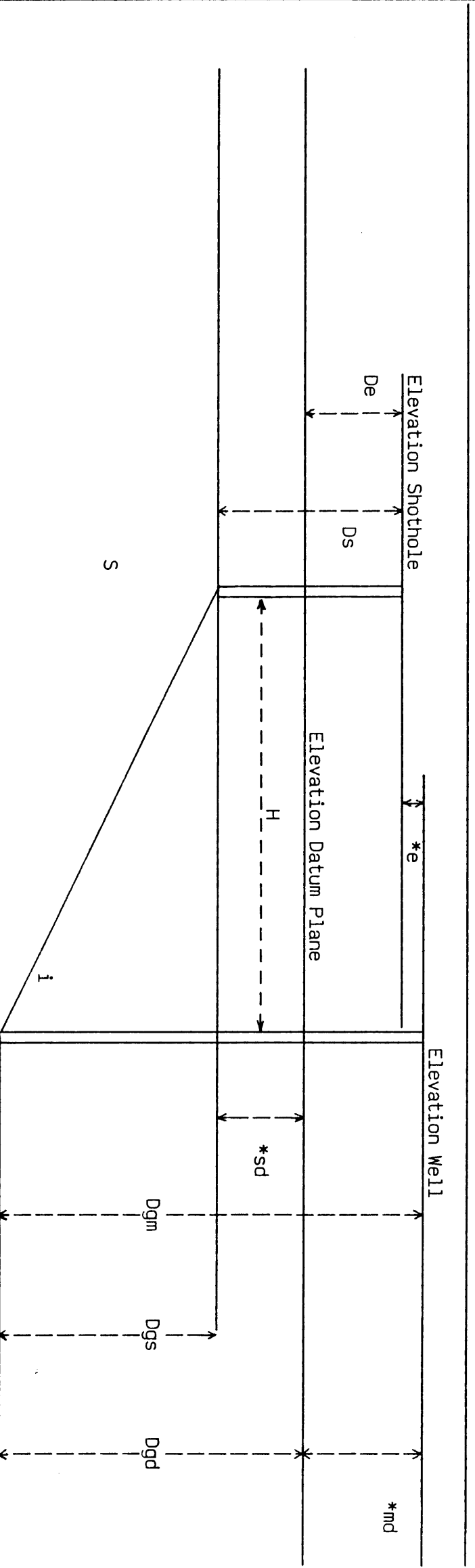
CONCLUSION

Reliability of T-D curveGood.....

COMMENTS

Shothole Information - Elevation,
Distance and Direction from Well
-4ms for alias filtering
Gun depth 12.2m
Gun offset 35m N

Elevation (Derrick Floor)	Total Depth	Co-ordinates	Datum	Country - Area/Field
21m RKB	3545 RKB	Lat. 38058'59.95"S Long. 142031'48.94"E	M.S.L.	OTWAY



Dgm = Geophone depth measured from well elevation
 Dgs = Geophone depth measured from shot elevation
 Dgd = Geophone depth measured from datum elevation
 *e = Difference in elevation between well and shotpoint
 *sd = Difference in elevation between shot and datum plane
 *sd = Ds - De
 Dgs = Dgm - Dst *e; tan i = $\frac{H}{Dgs}$
 Tgs = cos i T = Vert. travel time from shot elev. to geophone
 Tgd = Tgs + $\frac{*sd}{V}$ = Vert. travel time from datum plane to geophone
 Dgd = Dgm + *md
 Sn = Shotpoint number
 Re = Reading
 Surveyed By : Velocity Data Date : 23. 3.82 Casing Record : 20" @ 240m; 133/8" @ 1042m ; 95/8" @ 2811 m RKB

Ds = Depth of shot
 De = Shothole elevation to datum plane
 H = Horizontal distance from well to shotpoint
 S = Straight line travel path from shot to well geophone
 T = Observed time from shotpoint to well geophone
 *sd = Is in milliseconds
 tr = Observed time from shotpoint to reference geophone
 vi = Interval velocity = $\frac{*Dgd}{*Tgd}$
 Va = Average = $\frac{Dgd}{Tgd}$
 Rn = Record number
 Tgs = Time of shot
 Gi = Grade

Rn	Run	Tos	Dgm	Ds	Tr	Re	Gr	Dgs	H	Tan i	Cos i	Tgs	*sd	*sd V	Tgd	Tgd/Av	Dgd	*Dgd	*Tgd	Vi	Va	
42	1	0220	333	12.2		.104	VP	299.8	33	.11007	.994	.1034	12.2	10	.1134	.1114	312				2801	
43	1	0223				.100						.0994			.1094							
1	1	2137	608			.149	P	547.8		.0574	.998	.1488			.1588	.1641	587	275	.0527	5218	3577	
2		2139				.148						.1478			.1578							
79	2	0815				.151						.1507			.1607							
80		0817				.164	VP					.1637			.1737							
81		0819				.160						.1597			.1697							
40	1	0205	1103			.435	P	1069.8		.0309	.999	.4348			.4448	.4433	1082					2441
41		0207				.432						.4318			.4418							
35		0035	1455			---	NR	1421.8		---	---	---			---	.5509	1434	352	.1076	3271		2603
36		0040				---									---							
37		0147				---									---							
38		0149				.541	P			.0232	.999	.5409			.5509							
39		0151					VP															
3		2208	1718			.632	P	1684.8		.0196	.999	.6319			.6419	.6439	1697	263	.0930	2828		2635
4		2210				.635						.6349			.6449							
5		2212				.634	F					.6339			.6439							
6		2214					P															
7		2216																				
44	2	0500				.635	F					.6349			.6449							
45		0502				.634	P					.6339			.6439							
31	1	0015	1740			.639		1706.8		OFFSET	DOES	NOT			.649	.6485	1719	22	.0046	4783		2651
32		0017				.638	VP			EFFECT		TIME			.648							
33		0019																				
34		0020				.639	F								.649							
28		0002	2000			.726	VP	1966.8							.736	.734	1979	260	.0855	3041		2696
29		0004				.723	P								.733							

Rn	Run	ToS	Dgm	Ds	Tr	Re	Gr	Dgs	H	Tan I	Cos I	Tgs	*sd	*sd V	Tgd	Tgd/Av	Dgd	*Dgd	*Tgd	Vi	Va	
30	1	0006		12.2		.723	P		33	OFFSET	DOES	NOT	12.2	10	.733			200	.0760	2632		
25		2340	2200			.800	F	2166.8		AFFECT		TIME			.810	.810	2179				2690	
26		2345																				
27		2350				--	NR								--			250	.0837	2987		
22		2335	2450			.884	F	2416.8							.894	.8937	2429				2718	
23		2337				.883									.893							
24		2338				.884									.894			100	.0320	3125		
9		2225	2550			.916		2516.8							.926	.9257	2529				2732	
10		2227				.915									.925							
11		2229				.916	F								.926			88	.0273	3223		
46	2	0525	2638			.943		2604.8							.953	.953	2617				2746	
47		0527																--	--	--		
20	1	2323	2645			.945	G	2611.8							.955	.954	2624				2750	
21		2325				.943	F								.953			112	.0343	3265		
17		2310	2750			.976		2716.8							.986	.9873	2729				2764	
18		2312				.978									.988							
19		2315													.988			35	.0147	2381		
12		2258	2785			--	NR	2751.8							--	1.002	2764				2758	
13		2259				.996	P								1.006							
14		2302				.992	F								1.002							
15		2304				.989									.999							
16		2306				.992									1.002			45.5	.0130	3500		
76	2	0740	2830.5			1.005		2797.3							1.015	1.015	2809.5				2768	
77		0742				1.004									1.014							
78		0744				1.006									1.016			150	.0420	3571		
73		0730	2980.5			1.048	P	2947.3							1.058	1.057	2959.5				2800	
74		0732				1.046	F								1.056							

Rn	Run	Tos	Dgm	Ds	Tr	Re	Gr	Dgs	H	Tan i	Cos i	Tgs	*sd	*sd V	Tgd	Tgd/Av	Dgd	*Dgd	*Tgd	Vi	Va
75	2	0734		12.2		1.047	F		33	OFFSET	DOES	NOT	12.2	10	1.057			95	.0292	3253	
48		0545	3075.5			1.077	P	3042.3		AFFECT		TIME			1.087	1.0862	3054.5				2812
49		0547				1.076									1.086						
50		0549																			
71		0715					F														
72		0717																			
68		0705	3202			1.109	G	3168.8							1.119	1.1183	3181	126.5	.0321	3941	2844
69		0707				1.108	P								1.118						
70		0709					F											106.5	.0297	3586	
65		0650	3308.5			1.139		3275.3							1.149	1.148	3287.5				2864
66		0652				1.138									1.148						
67		0654				1.137									1.147			99.5	.0260	3827	2885
51		0600	3408			1.164	P	3374.8							1.174	1.174	3387				
52		0602					F														
53		0604																--	--	--	
55		0615	3432.5			1.166	G	3399.3							1.176	1.176	3411.5				2901
56		0617					F														
57		0619					G											65.5	.0133	4925	
62		0620	3473.5			1.177	F	3440.3							1.187	1.1873	3452.5				2908
63		0622				1.178									1.188						
64		0624				1.177									1.187						
58		0630	3540			1.190	P	3506.8							1.200	1.1998	3519	66.5	.0125	5320	2933
59		0632				1.189									1.199						
60		0634				1.190									1.200						
61		0636					F														

VELOCITY SURVEY ERROR CHECK

TRITON NO. 1

Depth Rel.S.L. (m)	Av. Vertical Travel Time (check shots)	Ti Check Shots (sec.)	Ti Sonic Log (sec.)	Δ (Milliseecs.) Ti - Ti Check Sonic	Depth Interval (m.)	Error (Microsec. per m.)
312	0.1114					
587	0.1641	0.0527	.0537	- 1.0	275	3.6
587	0.1641					
1082	0.4433	0.2792	.2746	4.6	495	9.3
1082	0.4433					
1434	0.5509	0.1076	.1058	1.8	352	5.1
1434	0.5509					
1697	0.6439	0.0930	.0793	13.7	263	52.1
1697	0.6439					
1719	0.6485	0.0046	.0071	-2.5	22	113.6
1719	0.6485					
1979	0.734	0.0855	.0871	-1.6	260	6.2
1979	0.734	0.0760	.0674	8.6	200	43.0
2179	0.810					
2179	0.810	0.0837	.0833	0.4	250	1.6
2429	0.8937					
2429	0.8937	0.0320	-	-	100	-
2529	0.9257					
2529	0.9257	0.0273	-	-	88	-
2617	0.953					
2617	0.953	0.0343	-	-	112	-
2729	0.9873					
2729	0.9873	0.0147	-	-	35	-
2764	1.002					
2764	1.002	0.0130	-	-	45.5	-
2809.5	1.015					
2809.5	1.015	0.0420	.0432	-1.2	150	8.0
2959.5	1.057					
2959.5	1.057	0.0292	.0262	3.0	95	31.6
3054.5	1.0862					

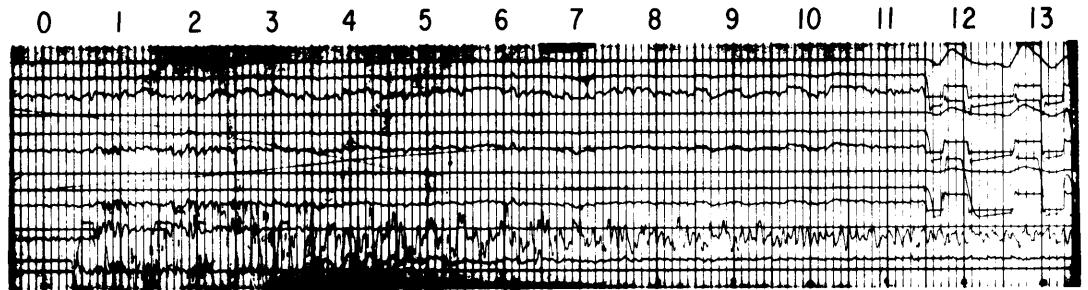
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WELL VELOCITY RECORD

20 - 4 - 82

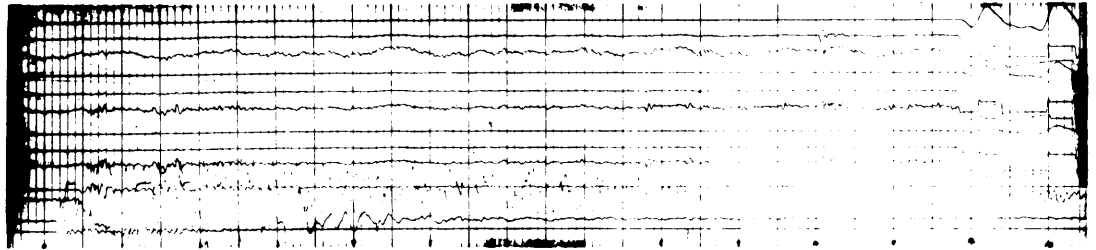
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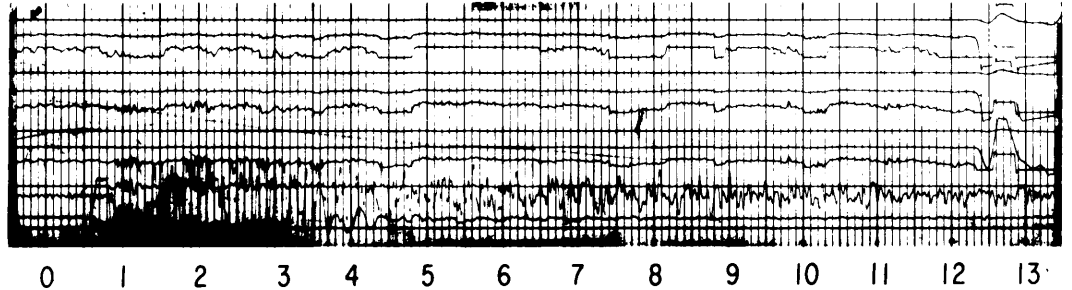
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3432.5 m. KB



Rec. No. 63

3473.5 m. KB

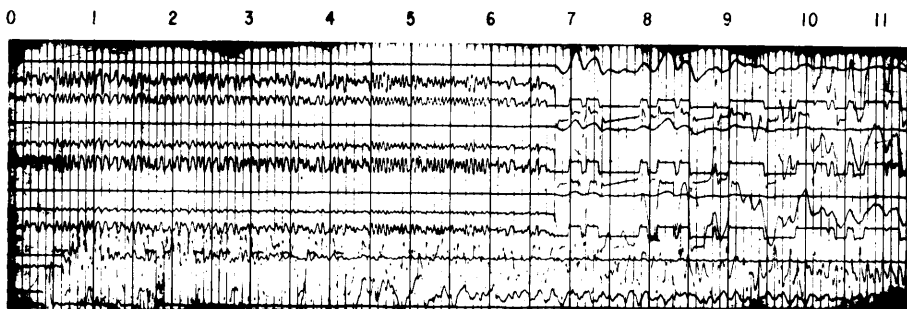


TRITON-1

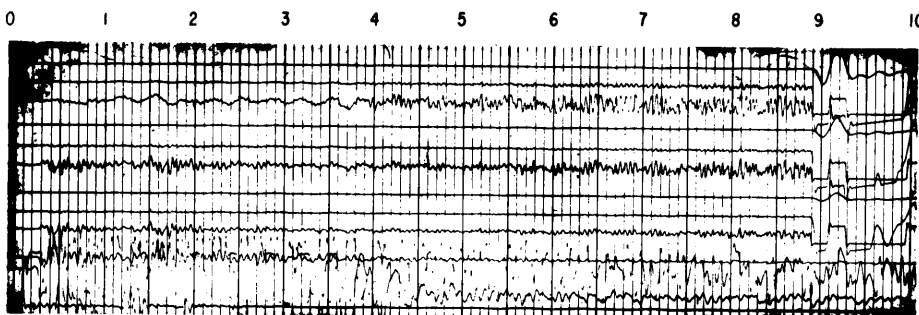
WELL VELOCITY RECORD

23-3-82

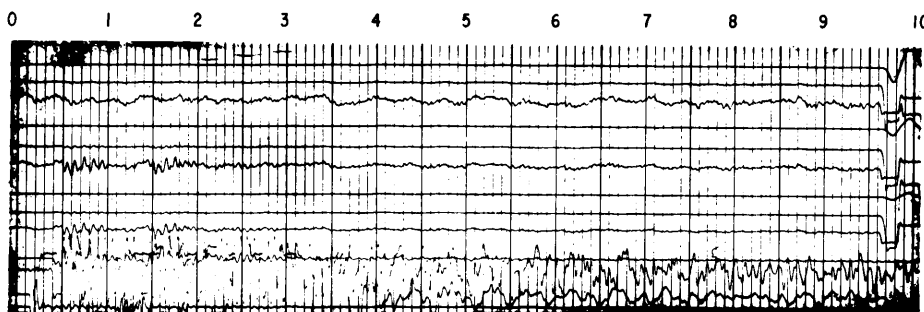
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1740m RKB



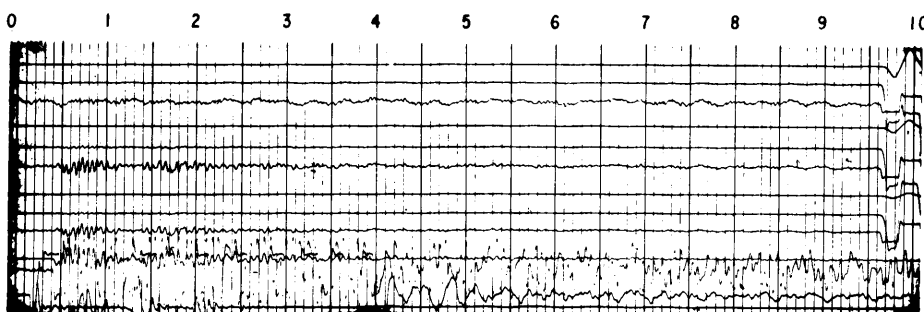
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2450m RKB



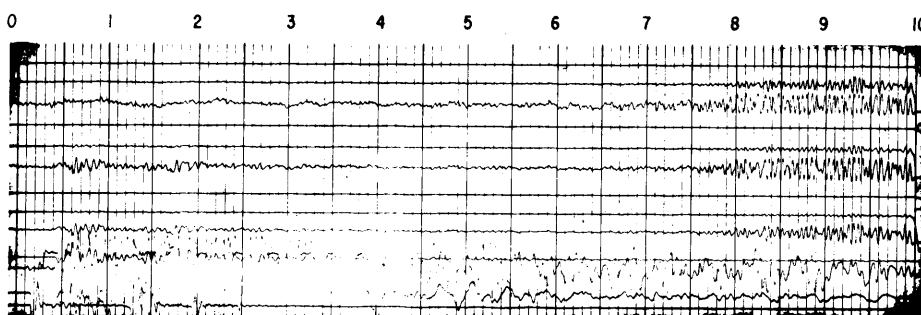
Rec No 21
2645m RKB



Rec No 20
2645m RKB



Rec No 18
2750m RKB



PE600523

This is an enclosure indicator page.
The enclosure PE600523 is enclosed within the
container PE900434 at this location in this
document.

The enclosure PE600523 has the following characteristics:

- ITEM-BARCODE = PE600523
- CONTAINER_BARCODE = PE900434
- NAME = Triton 1 Well Completion Log, Enclosure
3a
- BASIN = OTWAY
- PERMIT = VIC/P15
- TYPE = WELL
- SUBTYPE = COMPOSITE_LOG
- DESCRIPTION = Triton 1 Well Completion Log, Enclosure
3a
- REMARKS =
- DATE-CREATED = *
- DATE-RECEIVED = *
- W_NO = W766
- WELL-NAME = TRITON-1
- CONTRACTOR = ESSO
- CLIENT_OP_CO = ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE600599

This is an enclosure indicator page.
The enclosure PE600599 is enclosed within the
container PE901824 at this location in this
document.

The enclosure PE600599 has the following characteristics:

- ITEM-BARCODE = PE600599
- CONTAINER_BARCODE = PE901824
- NAME = Triton 1 sidetrack Well Completion Log,
Enclosure 3b
- BASIN = OTWAY
- PERMIT = VIC/P15
- TYPE = WELL
- SUBTYPE = COMPOSITE_LOG
- DESCRIPTION = Triton 1 sidetrack Well Completion Log,
Enclosure 3b
- REMARKS =
- DATE-CREATED = *
- DATE-RECEIVED = *
- W_NO = W766
- WELL-NAME = Triton 1 sidetrack
- CONTRACTOR = ESSO
- CLIENT_OP_CO = ESSO AUSTRALIA LTD

(Inserted by DNRE - Vic Govt Mines Dept)

PE900592

This is an enclosure indicator page.
The enclosure PE900592 is enclosed within the
container PE901824 at this location in this
document.

The enclosure PE900592 has the following characteristics:
ITEM-BARCODE = PE900592
CONTAINER_BARCODE = PE901824
NAME = Triton 1 Time Depth Curve, Enclosure 4a
BASIN =

OTWAY

PERMIT = VIC/P15
TYPE = WELL
SUBTYPE = VELOCITY_CHART
DESCRIPTION = Triton 1 Time Depth Curve, Enclosure 4a
REMARKS =
DATE-CREATED = 1/05/82
DATE-RECEIVED = 28/10/82
W_NO = W766
WELL-NAME = Triton-1
CONTRACTOR = ESSO
CLIENT_OP_CO = ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE901825

This is an enclosure indicator page.
The enclosure PE901825 is enclosed within the
container PE901824 at this location in this
document.

The enclosure PE901825 has the following characteristics:

- ITEM-BARCODE = PE901825
- CONTAINER_BARCODE = PE901824
- NAME = TRITON PROSPECT DEPTH STRUCTURE MAP RED
HORIZON "2000" SEISMIC HORIZON NEAR
THE TOP OF THE WAARRE FORMATION
- BASIN = OTWAY
- PERMIT = VIC/P15
- TYPE = SEISMIC
- SUBTYPE = HRZN_CONTR_MAP
- DESCRIPTION = TRITON PROSPECT DEPTH STRUCTURE MAP RED
HORIZON "2000" SEISMIC HORIZON NEAR
THE TOP OF THE WAARRE FORMATION;
ENCLOSURE 1
- REMARKS =
- DATE-CREATED = 1/09/82
- DATE-RECEIVED = 28/10/82
- W_NO = W766
- WELL-NAME = TRITON-1
- CONTRACTOR = ESSO
- CLIENT_OP_CO = ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE901826

This is an enclosure indicator page.
The enclosure PE901826 is enclosed within the
container PE901824 at this location in this
document.

The enclosure PE901826 has the following characteristics:

ITEM-BARCODE = PE901826
CONTAINER_BARCODE = PE901824
 NAME = STRATIGRAPHIC CROSS SECTION SHOWING
 TRITON-1
 BASIN = OTWAY
 PERMIT = VIC/P15
 TYPE = WELL
 SUBTYPE = CROSS_SECTION
 DESCRIPTION = STRATIGRAPHIC CROSS SECTION SHOWING
 TRITON-1
 REMARKS =
 DATE-CREATED = 1/09/82
 DATE-RECEIVED = 28/10/82
 W_NO = W766
 WELL-NAME = TRITON-1
 CONTRACTOR = ESSO
 CLIENT_OP_CO = ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE901827

This is an enclosure indicator page.
The enclosure PE901827 is enclosed within the
container PE901824 at this location in this
document.

The enclosure PE901827 has the following characteristics:

ITEM-BARCODE = PE901827
CONTAINER_BARCODE = PE901824
 NAME = Triton 1 Sonic Calibration Curve,
 Enclosure 4b
 BASIN = OTWAY
 PERMIT = VIC/P15
 TYPE = WELL
 SUBTYPE = VELOCITY_CHART
 DESCRIPTION = Triton 1 Sonic Calibration Curve,
 Enclosure 4b
 REMARKS =
 DATE-CREATED = 1/08/82
 DATE-RECEIVED = 28/10/82
 W_NO = W766
 WELL-NAME = TRITON-1
 CONTRACTOR = ESSO
 CLIENT_OP_CO = ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE901828

This is an enclosure indicator page.
The enclosure PE901828 is enclosed within the
container PE901824 at this location in this
document.

The enclosure PE901828 has the following characteristics:

ITEM-BARCODE = PE901828
CONTAINER_BARCODE = PE901824
NAME = TRITON 1 WELL-TO-SEISMIC TIE AND
SYNTHETIC SEISMOGRAM LINE OE80A
BASIN = OTWAY
PERMIT = VIC/P15
TYPE = SEISMIC
SUBTYPE = SECTION
DESCRIPTION = TRITON 1 WELL-TO-SEISMIC TIE AND
SYNTHETIC SEISMOGRAM LINE OE80A
REMARKS =
'DATE-CREATED = 1/10/81
DATE-RECEIVED = 28/10/82
W_NO = W766
WELL-NAME = TRITON-1
CONTRACTOR = ESSO
CLIENT_OP_CO = ESSO

(Inserted by DNRE - Vic Govt Mines Dept)