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Esso Australia Pty Ltd

WELL COMPLETION REPORT
EAST PILCHARD-1
VOLUME 2
INTERPRETIVE DATA

NOVEMBER 2001

Esso Australia Pty Ltd

908923 002

WELL COMPLETION REPORT
EAST PILCHARD-1
VOUME 2
INTERPRETIVE DATA

November 2001

WELL COMPLETION REPORT

EAST PILCHARD 1

VOLUME 2
INTERPRETIVE DATA

GIPPSLAND BASIN
VICTORIA

ESSO AUSTRALIA PTY LTD

Compiled by Gerard O'Halloran, Sheryl Sazenis
November 2001

900923 004

WELL COMPLETION RPEORT
EAST PILCHARD 1

VOLUME 2:

INTEPRETATIVE DATA

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EAST PILCHARD 1

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1. INTRODUCTION

The East Pilchard-1 well was drilled as a wildcat exploration well, approximately 4 km south-west of Kipper-1 (Figure 1). The well was located in 91 metres of water, within the VIC/L9 licence area of the Gippsland Basin, and was drilled to a TD of 3113m TVDss.

The well spudded on 3rd July 2001, and TD was reached on the 1st August 2001. The well was cased and suspended as a future gas producer, and the rig was released on the 13th August 2001.

The East Pilchard-1 well targeted hyrdrocarbons in the fluvial-deltaic reservoirs of the sub-volcanic Golden Beach and Emperor Subgroups (*T.lilliei – N.Senectus - T.apoxyexinus* age). A lowside fault dependent closure was mapped on the Pilchard fault block and flatspots had been identified. The primary risk for the East Pilchard-1 well was that of fault seal, and that the "flatspots" observed were related to residual gas, or lithological complications within the reservoir section.

2. SUMMARY OF WELL RESULTS

A comparison of prognosed versus actual formation tops penetrated in East Pilchard 1 is summarised in Table 1, and the relevant stratigraphy is summarised in Figure 2. The prognosed stratigraphy was based on adjacent well data and regional seismic correlations, however the reservoir section at East Pilchard-1 had not been intersected in its entirety in any one well.

The well intersected the sub-volcanic reservoir section 3m high to prognosis, although the sealing volcanic interval itself was approximately 60m thicker than expected. A lower than expected net to gross reservoir section was encountered, and this has resulted in multiple top and base sealed reservoir systems (referred to here as the S100, S200, S300, S400, and S500 series systems).

The well found a total of 100.7 net metres of gas in the subvolcanic reservoir section. Gas bearing sands were seen from 2592.2m-2793.0 m MD (S100 to S320 reservoirs). No clear hydrocarbon contacts were seen on the log data, with all these upper intervals being gas on rock. A series of thinner gas bearing sands (intercalated with water-bearing sands) were then intersected down to 2966.2m MD (S400 reservoirs). A thick shaley interval was then drilled from the base of the S400 series to 3023.8m MD. From this depth to TD (3138m MD) a series of thinner, lower quality gas bearing sand intervals were encountered (S500 series).

2592.2
3138
545.8

Lab derived compositional analysis for East Pilchard 1 gas samples indicate that CO2 levels in the subvolcanic reservoirs range between 11.2-22.1%, with no clearly defined trend with increasing depth.

Column heights for the various reservoir systems remain unclear, and largely depend on water gradients assumed (see attached pressure profiles, and further discussions below).

3. GEOLOGICAL DISCUSSION

OVERVIEW

Exploration in the Gippsland basin has historically focussed on upper Latrobe structural and stratigraphic traps. Tests of deeper hydrocarbon potential (in the Golden Beach and Emperor Subgroups) have generally been confined to wells targeting Top of Latrobe closures but which were subsequently deepened to explore secondary objectives. The Kipper-1 well (1986) drilled into the Late Cretaceous sub-volcanic reservoir section and encountered the largest hydrocarbon column in the Gippsland Basin (~320m gross gas column). The recognition that such large columns of hydrocarbon can be trapped in fault dependent closures has led to renewed interest in the Golden Beach and Emperor Subgroups (the active rift-phase successions of the Gippsland Basin).

The G99A Kipper 3D seismic survey was aquired in 1999 to progress delineation of the Kipper gas field. The area of the survey was designed to be large enough to extend over several adjacent fault blocks, and the high quality of the data enabled mapping of the Golden Beach and Emperor Subgroups over much of the survey area. Initial interpretation of the G99A data resulted in recognition of flatspots and lowside fault dependent closures on several fault ramps, including the East Pilchard area. The greater Pilchard closure is largely within the VIC/L9 licence area, but a small proportion of the East Pilchard trap area does straddle the boundary with VIC/RL2 (Figure 1).

REGIONAL SETTING

The initial formation of the Gippsland Basin was associated with rifting and subsidence that extended along the southern margins of Australia during the Jurassic to Early Cretaceous. During this period, deposition of predominantly volcanoclastic successions occurred in alluvial and fluvial environments, in NE trending en-echelon graben systems (Otway and Strzelecki groups). A phase of structuring and localised uplift of the Strzelecki Group occurred around 100-95Ma.

A renewed phase of Late Cretaceous (approximately 90 Ma) rifting coincided with the onset of Tasman seafloor spreading to the east of Tasmania. This resulted in the rapid development of extensional basins in the Gippsland area, with active extensional faults oriented WNW/ESE (oblique to the earlier extensional event). A thick (overall coarsening-up) succession was deposited in these tectonically active depocentres (Emperor-Golden Subgroups). Initial rift deposition included marine and lacustrine shales in distal parts of the basin, while deltaic successions and alluvial fans developed along basin margins. The rift fill succession gradually evolved into a fluvial-dominated system. The upper parts of the Golden Beach Subgroup (eg. Kipper sub-volcanic reservoir section) were predominantly braided fluvial to delta plain in character. As the northward migrating Tasman spreading centre passed by the Gippsland Basin around 85-80Ma, the eruption of mafic volcanics and emplacement

3. GEOLOGICAL DISCUSSION (CONT'D)

of related intrusions occurred across the Gippsland basin. These volcanics form the topseal for several important hydrocarbon accumulations (eg. the Kipper volcanics).

The active rift phase in the Gippsland Basin ceased at approximately 80 Ma, as the Tasman Rift proceeded to migrate further northwards towards Queensland. From this time onwards, the Gippsland Basin evolved into essentially a failed arm of the Tasman rift system. The Latrobe Group was deposited in this sag phase basin setting, with fault controlled subsidence continuing until the Late Paleocene. Most of the Latrobe Group was deposited in a non-marine setting behind a NE-SW tending beach-barrier complex. As sedimentation rates declined, the strandline moved to the northwest, depositing thin Eocene-aged glauconitic green sands over a wide area (Gurnard Formation).

Two major phases of canyon cutting occurred during the Tertiary. The Early Eocene Tuna/Flounder Channel was cut and then filled with predominantly marine sediments of the Flounder Formation. The Marlin Channel was cut during the Middle Eocene and partially filled with distal marine sediment of the Turrum Formation. Erosion associated with the top of Latrobe Group unconformity resulted in the formation of many of the hydrocarbon traps in the basin.

The end of the Latrobe Group is marked by deposition of marl and calcareous siltstone of the Lakes Entrance Formation in response to continued marine transgression in the Oligocene. Prograding limestone and calcareous siltstone wedges of the Gippsland Limestone result in the formation of the present day shelf.

Compressional events in the late Eocene to mid Miocene caused selective inversion of faults around the basin and the establishment of the major ENE-WSW anticlinal trends in the basin.

STRATIGRAPHY

The prognosed stratigraphy for the East Pilchard well was based on adjacent well data (Kipper 1 and 2 wells, and Tuna-1, Tuna-A18, Chimaera-1 and Manta-1).

The actual stratigraphic section intersected is shown in Figure 2. The well penetrated the expected thick sequence of limestones and marls of the Gippsland Limestone and the Lakes Entrance Formation. The Top Latrobe marker came in 4m low to prognosis. The upper Latrobe Group (lower *M. diversus* to the basal upper *L. balmei* age) section varies from thick upper shoreface sand packages with occasional lower shoreface sands and shales in the upper section to a lower succession dominated by shales and thin sheet sands deposited in a lower delta plain environment. Some thin coals, single channel sands generally less than 5m thick, minor point bars and some crevasse splay deposits also occur within this section.

3. GEOLOGICAL DISCUSSION (CONT'D)

The lower Latrobe Group interval (lower *T.longus*- upper *T.lilliei)* is comprised of braided to meandering fluvial non-marine deposits and marginal marine estuarine and bayhead delta deposits. Coals are more common than in the upper Latrobe section.

The primary objective of the East Pilchard-1 well was to test the sub-volcanic oil potential of the Golden Beach and Emperor Subgroups. The top of volcanics came in 65m high to prognosis (2430m MD), and in total the volcanic section intersected was more than 160m thick. Volcanic lithologies encountered include volcanic flows and weathered equivalents, as well as an intrusive body near the TD of the well. A series of intravolcanic sand intervals (water wet) was also intersected (2520.0-2557.8m MD). The top of the subvolcanic reservoir interval came in close to prognosis (3m high 2592.2m MD). The primary S reservoir was expected to comprise a succession of good quality, high net-to-gross braided fluvial to upper delta plain sands (as seen in the Kipper wells to the north). However, the actual reservoir section intersected proved to be a lower net-to-gross fluvial package than prognosed, which accounts for the development of multiple top and base sealed reservoir systems.

STRUCTURE

Like the Kipper structure, the Pilchard trap is a lowside fault dependent closure. A long-lived major normal fault (Pilchard Fault) displays growth across it from at least *P.mawsonni* time (ie. Emperor Subgroup) through to the upper Latrobe Group. The structuring on the lowside of the fault was predominantly due to pulses of compressional deformation during the Eocene. However, there is also evidence for periods of structuring against the fault going back to to at least Golden Beach Subgroup time (as indicated by subtle isopach thinning along the fault). This may be a result of changes in the principle direction of extension from the late Cretaceous through to the Tertiary, with extension slightly oblique to fault orientation resulting in transpressional structuring on the lowside of growth faults.

The East Pilchard trap is fault dependent, and thus fault seal was seen as a major predrill risk. Sand-on-sand juxtapositional relationships occur at the sub-volcanic reservoir level along the Pilchard Fault, and a similar situation occurs in the Manta and Gummy area, however all three fault dependent traps have proven to contain significant hydrocarbon columns.

A final possible influence on the East Pilchard trap geometry (at least in the upper S100 and S200 levels) may be the presence of an intrusive body about half way along the East Pilchard fault ramp, which has been reflected in the depth maps for the S100 and S200 levels (Enclosure 2). The depth structure maps for these upper levels show them closing off at a deeper level than structural closure alone would allow. Whether these intrusives turn out to be the lateral trapping mechanism for postulated large gas

3. GEOLOGICAL DISCUSSION (CONT'D)

columns in the upper reservoirs remains to be tested by any future follow up Pilchard well(s). At the very least, the intrusive body on the Pilchard fault ramp might be regarded as a "plug" of non-net beneath the volcanic topseal.

HYDROCARBON DISTRIBUTION

The East Pilchard 1 well intersected multiple top and base sealed reservoir systems (S100 series through S500 series, Figures 3a-3e). No clearly identifiable contacts can be seen from the log data (much of the lower section of the well saw gas on rock interdispersed with water wet sands).

Gas column heights in the S100 system are largely dependent on what water/aquifer gradient is assumed. Figure 3a shows that an aquifer gradient at a slightly higher pressure than the regional Latrobe aquifer gradient will result in a contact for the S100A and S100B systems around 2710m TVDSS (close to the predrill interpretation of a flatspot), giving a column height in the order of 230m. A more pessimistic interpretation of the pressure data for the S100 series would assume an interpreted contact at the LKG found in the well. Similarly, column heights for the S200 reservoirs are dependent on aquifer gradients assumed (Figure 3b).

Better constrained water gradients in the S300 and S400 series result in lower most-likely column heights (generally ≤ 30m, Figures 3c, 3d).

The deeper S500 series reservoir intervals again have the possibility for very large column heights (Figure 3e) albeit in lower reservoir quality. If an aquifer system for the S500 reservoirs is assumed to have a slightly higher pressure than the aquifer for the S460/470 reservoirs (the deepest identifiable water wet sand in the well), then significant column heights (>300m) are possible. However, a more pessimistic interpretation of possible aquifer pressures might suggest that typical column heights maybe more similar to those in the S400 reservoirs (ie. generally < 30m).

4. GEOPHYSICAL DISCUSSION

GEOPHYSICAL DATA

The East Pilchard-1 prospect was identified using seismic data from the Kipper G99A 3D survey. The data was acquired in January 1999, and first pass interpretation had been completed by December 1999. Seismic quality on the Kipper G99A proved to be good, with much improved multiple suppression and signal-to-noise ratio compared to previous 2D and 3D data.

Five wells in the survey area were tied to the seismic data using synthetic seismograms (Kipper-1, Kipper-2, Stonefish-1, Admiral-1 and Judith-1). In addition, wells in adjacent 3D surveys were also used to control interpretation (Tuna-1, Tuna-A18, Chimaera-1, Manta-1, Gummy-1, Basker-1 and Basker South-1).

A synthetic seismogram was created in SEISMOD using good quality sonic and VSP/checkshot data, and is displayed along with a seismic tie line in Enclosure 3.

TIME INTERPRETATION

Time interpretations were completed on important horizons including; top of the Latrobe Group (TOL), Cretaceous/Tertiary flooding surface (KTFS), a marker horizon in the upper *T.lilliei* section (Tlill_tr3), top and base of Golden Beach Subgroup volcanics, and a deeper intra-reservoir volcanic flow. In addition, flatspots and intrusions were interpreted locally over the East Pilchard trap area. The primary pre-drill risk for these flatspots was that they may be related to a residual gas column, or to lithological complications in the reservoir.

The character of the sub-volcanic reservoir section over the Kipper 3D survey area shows that sands have relatively low impedance and shales/volcanics have relatively high impedance. These relationships aided in the interpretation of reservoir and volcanic units over the Pilchard Fault block. Stratigraphically concordant, high impedence features have been tied to basaltic extrusives in the Kipper-2, Chimaera-1, Manta-1, and Gummy-1 wells. In addition, there are also irregular, high impedence reflections which cross cut stratigraphy, which have been identified as intrusives. The TD of the East Pilchard 1 well was just within one of these intrusive bodies.

DEPTH CONVERSION

Depth conversion of the seismic time data utilised both seismic stacking velocities and well-based velocity data. Seismic stacking velocities were used to produce a depth conversion to the top of the Latrobe Group. A combined seismic velocity and well based mid-point depth function method was used to provide an isopach from top Latrobe to the top of the volcanics seismic marker. Interval velocities defined using seismic velocities were then used to produce an isopach which was added to the above horizons to depth convert the base of volcanics/top of S1 reservoir. This is the top of the main Kipper Field gas and oil accumulation. Below this level average velocities defined by wells were used to depth convert the top of the *P.mawsonii* section. The intra-Latrobe horizons were depth converted using a velocity volume that was constructed from all of the velocity fields described above. A selection of depth maps from throughout the subvolcanic reservoir section has been included in Enclosure 2.

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TABLES

FORMATION RESERVOIR TOPS

Formation/ Zone	mTVDSS			mMDRT
	Predicted	Actual	Difference	
Top Lakes Entrance Fm	-1200	-1170	30m high	1216
Top Latrobe Group	-1615	-1619	4m low	1644
KTFS	-2100	-2090	10m high	2115
Top of Volcanics	-2470	-2405	65m high	2430
Base of Volcanics (Top S reservoirs)	-2570	-2567	3m high	2592
Top 1st Volc	-2660	-n/a	-	-
Base 1st Volc	-2690	-n/a	-	-
TOTAL DEPTH	**-2900 (prelim)**	**-3113**		**3138**

Table 1.

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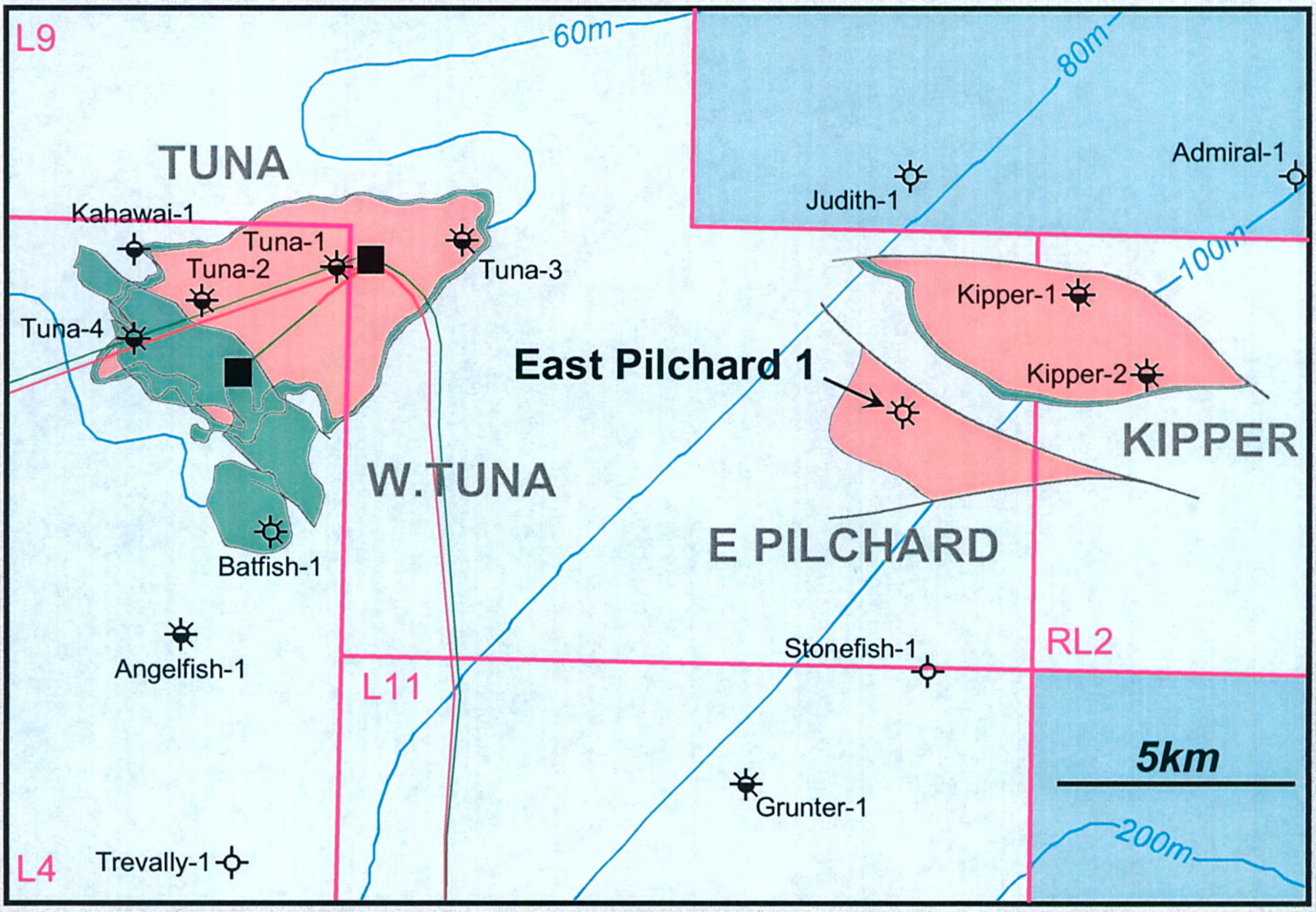
FIGURES

East Pilchard 1
LOCATION MAP

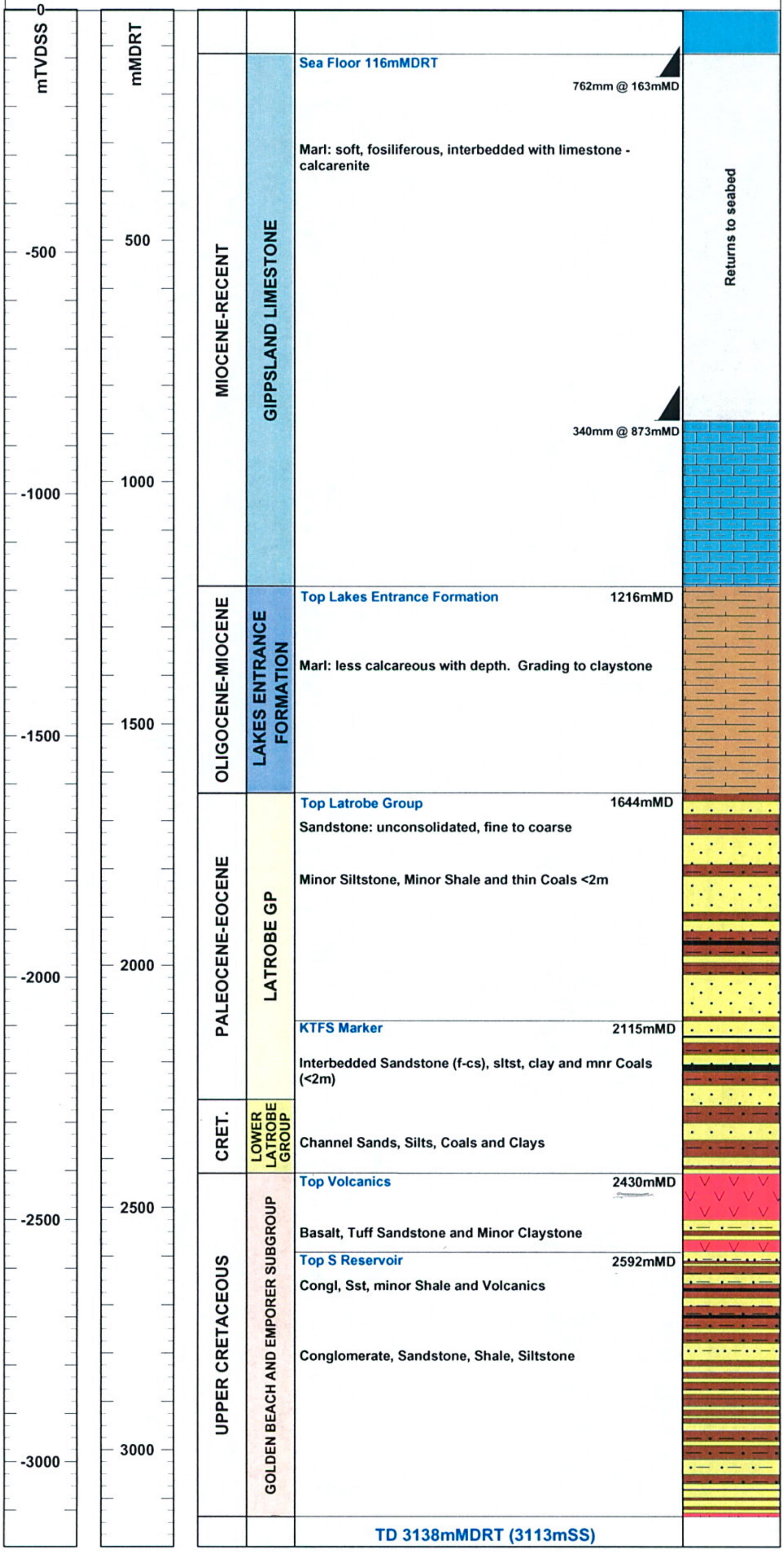


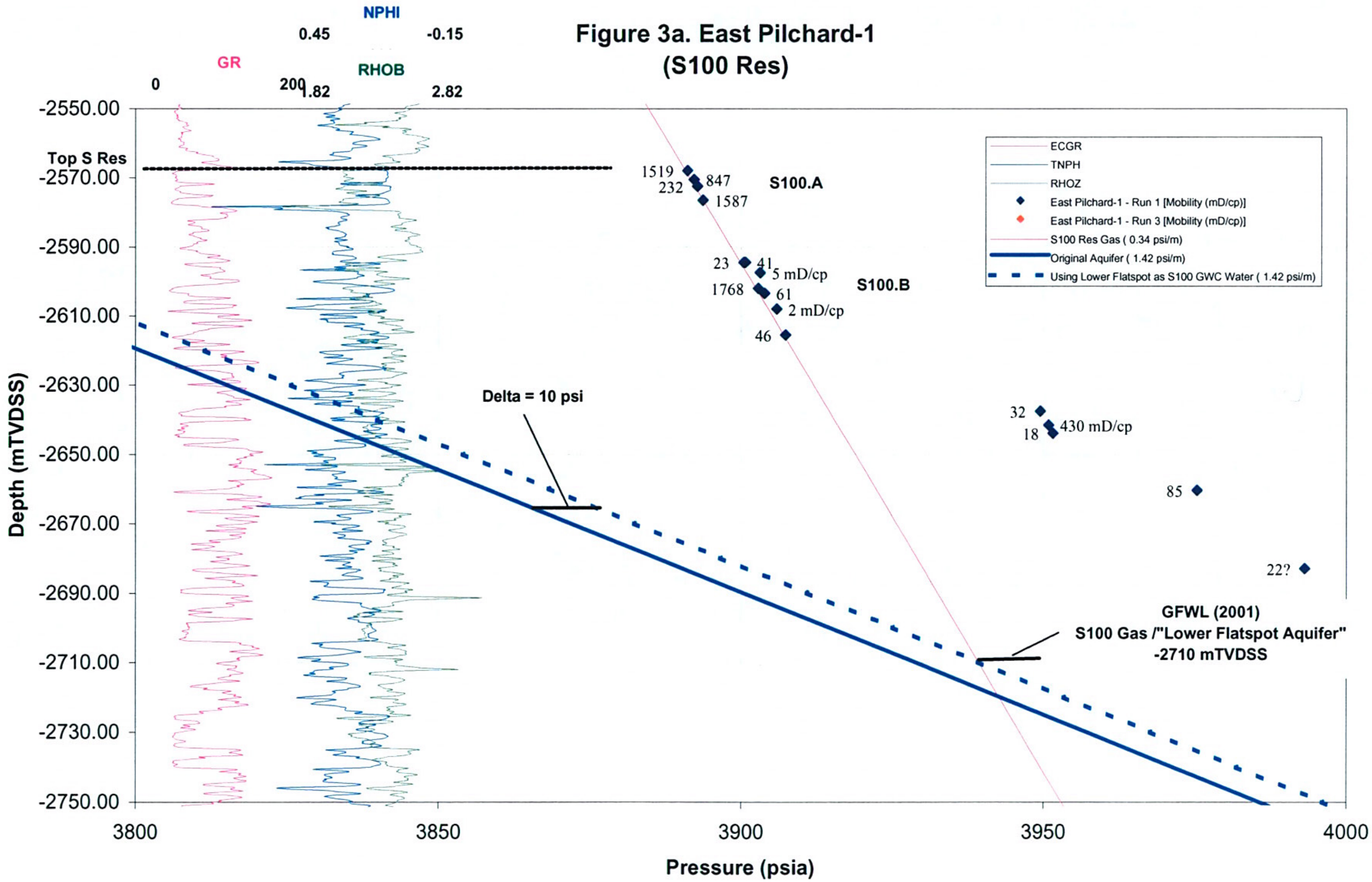
2001 044

FIGURE 1

FIGURE 2

EAST PILCHARD-1 STRATIGRAPHY





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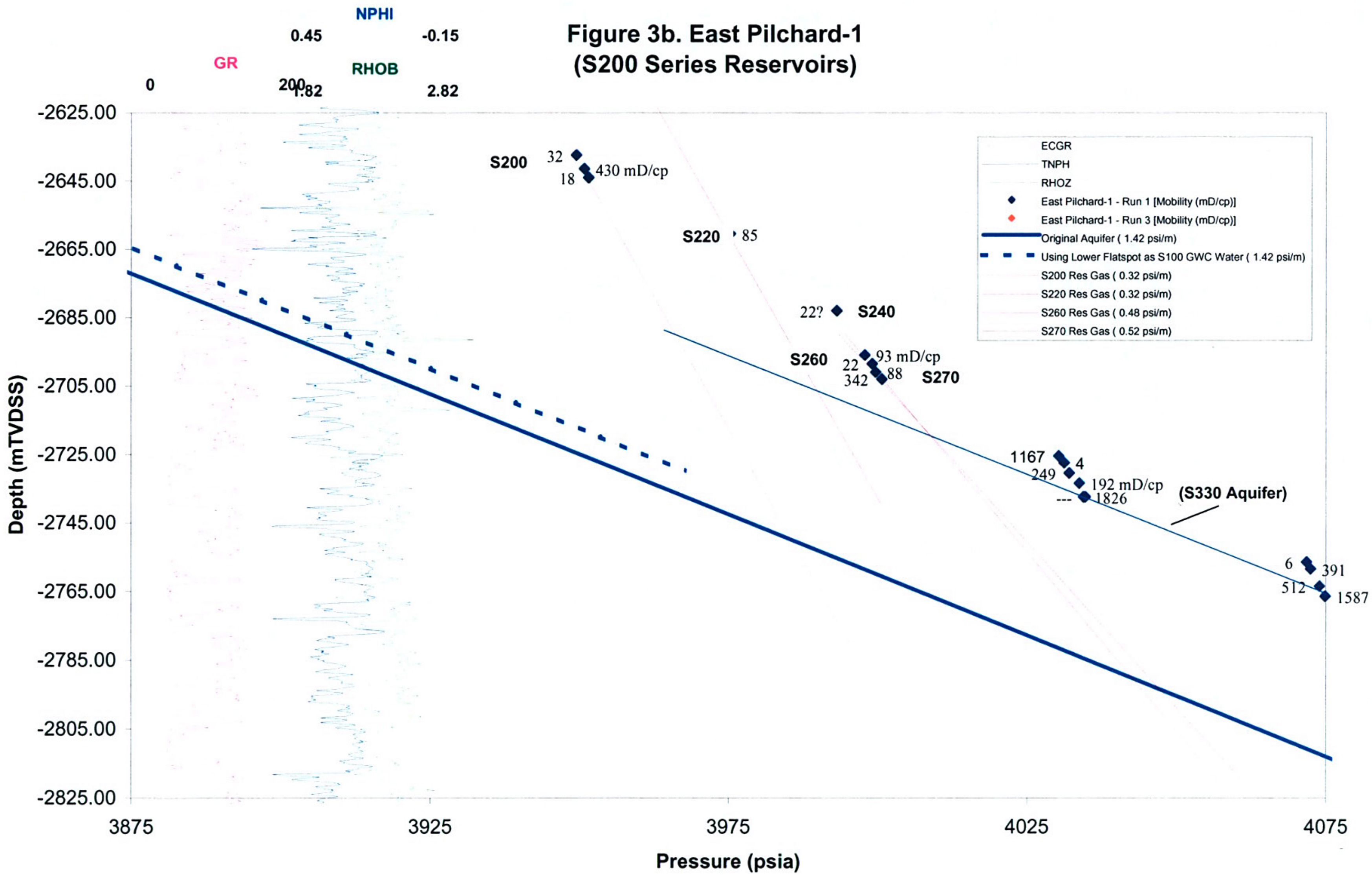
PE908923_color003



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Prepared by: M.B. Gilbert 11/02/02

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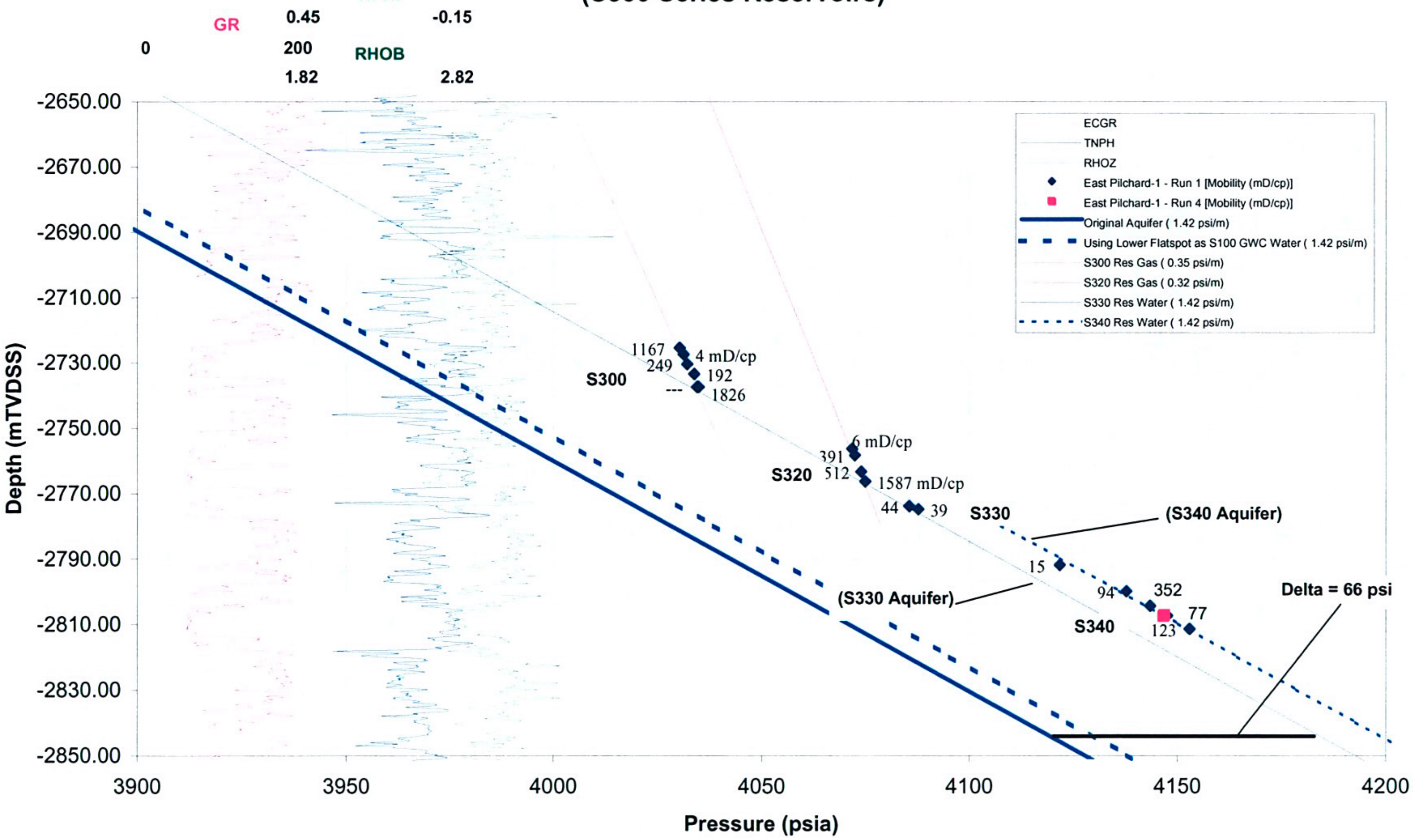
Figure 3c. East Pilchard-1
(S300 Series Reservoirs)



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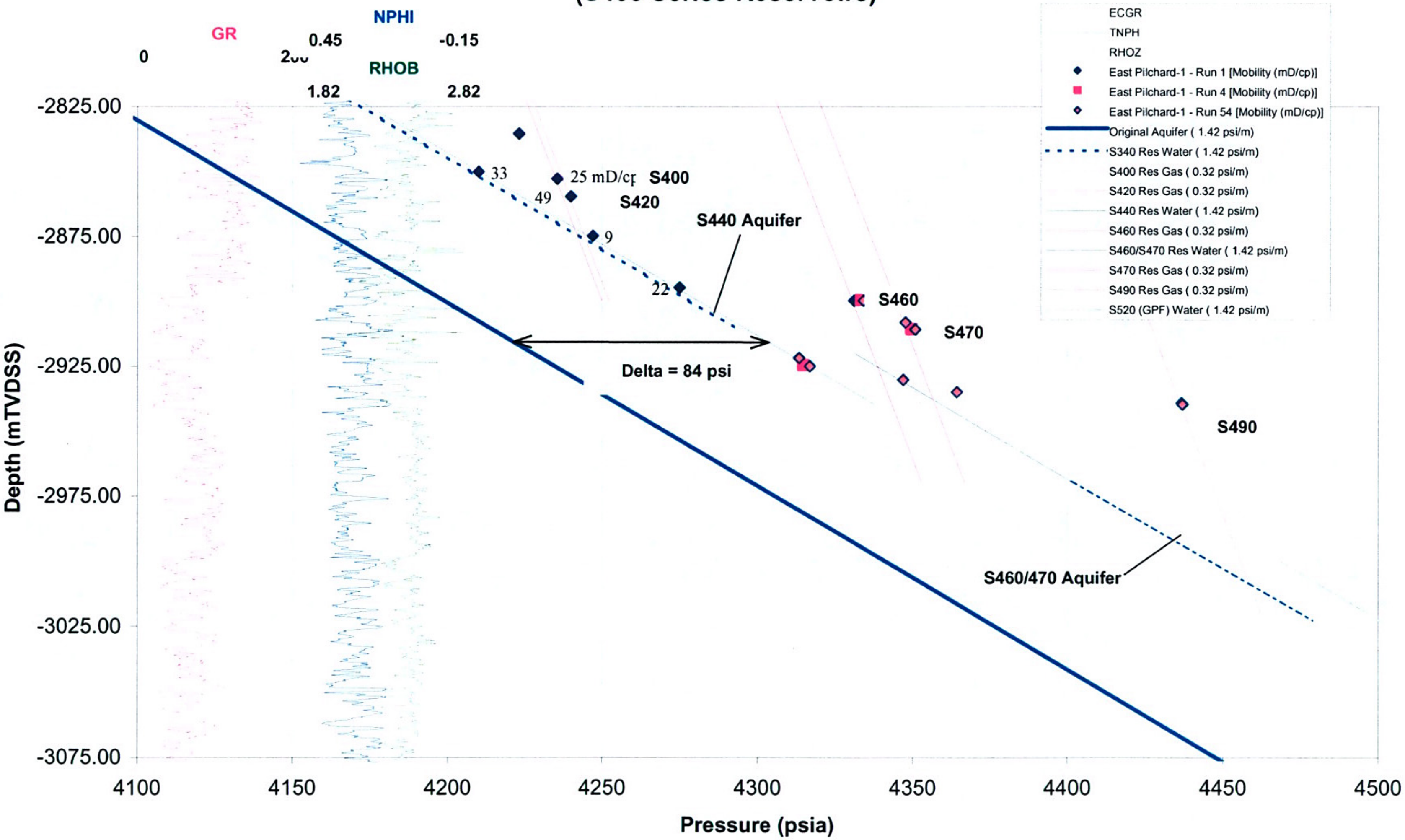
PE908923_color005

Figure 3d. East Pilchard-1
(S400 Series Reservoirs)



EP1_Pres_Data_GOH_WCR.xls

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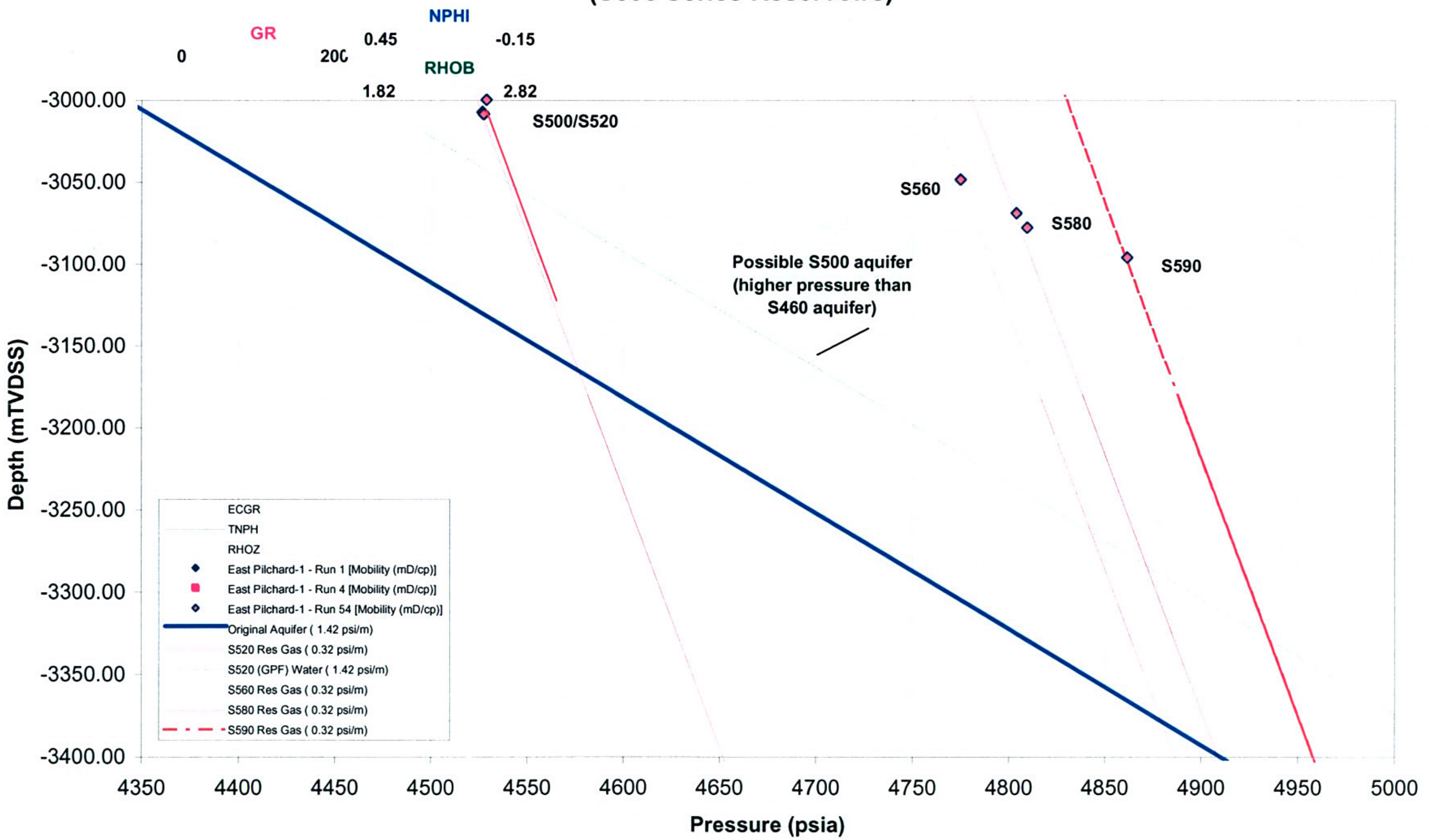
PE908923_color

3037
mTVDSS

Figure 3e. East Pilchard-1
(S500 Series Reservoirs)



908923 021

ENCLOSURES

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908923 025

ENCLOSURE 1

STRUCTURAL CROSS SECTION

PE908924

This is an enclosure indicator page.
The enclosure PE908924 is enclosed within the container PE908923 at this location in this document.

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   DATE_PROCESSED =
    DATE_RECEIVED = 13-FEB-2002
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        WELL_NAME = Kipper-2
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       ORIGINATOR =
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(Inserted by DNRE - Vic Govt Mines Dept)

908923 027

ENCLOSURE 2

POST DRILL DEPTH STRUCTURE MAP

PE908925

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DATA_SUB_TYPE = HRZN_CONTR_MAP
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DATE_PROCESSED =
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CONTRACTOR =
AUTHOR =
ORIGINATOR = Esso Australia Pty Ltd
TOP_DEPTH =
BOTTOM_DEPTH =
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(Inserted by DNRE - Vic Govt Mines Dept)

ENCLOSURE 3

SYNTHETIC SEISMOGRAM

908923 030

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DATE_PROCESSED =	
DATE_RECEIVED =	13-FEB-2002
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WELL_NAME =	East Pilchard-1
CONTRACTOR =	
AUTHOR =	
ORIGINATOR =	Esso Australia Pty Ltd
TOP_DEPTH =	
BOTTOM_DEPTH =	
ROW_CREATED_BY =	DN07_SW

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ATTACHMENTS

ATTACHMENT 1

COMPOSITE WELL LOG

PE607396

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                    Attachment 1
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(Inserted by DNRE - Vic Govt Mines Dept)

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APPENDICIES

APPENDIX 1

MDT ANALYSIS

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ExxonMobil

Esso Australia Pty Ltd

Exploration Department

EAST PILCHARD 1

WIRELINE FORMATON TESTING

KUMAR KUTTAN

December 2001

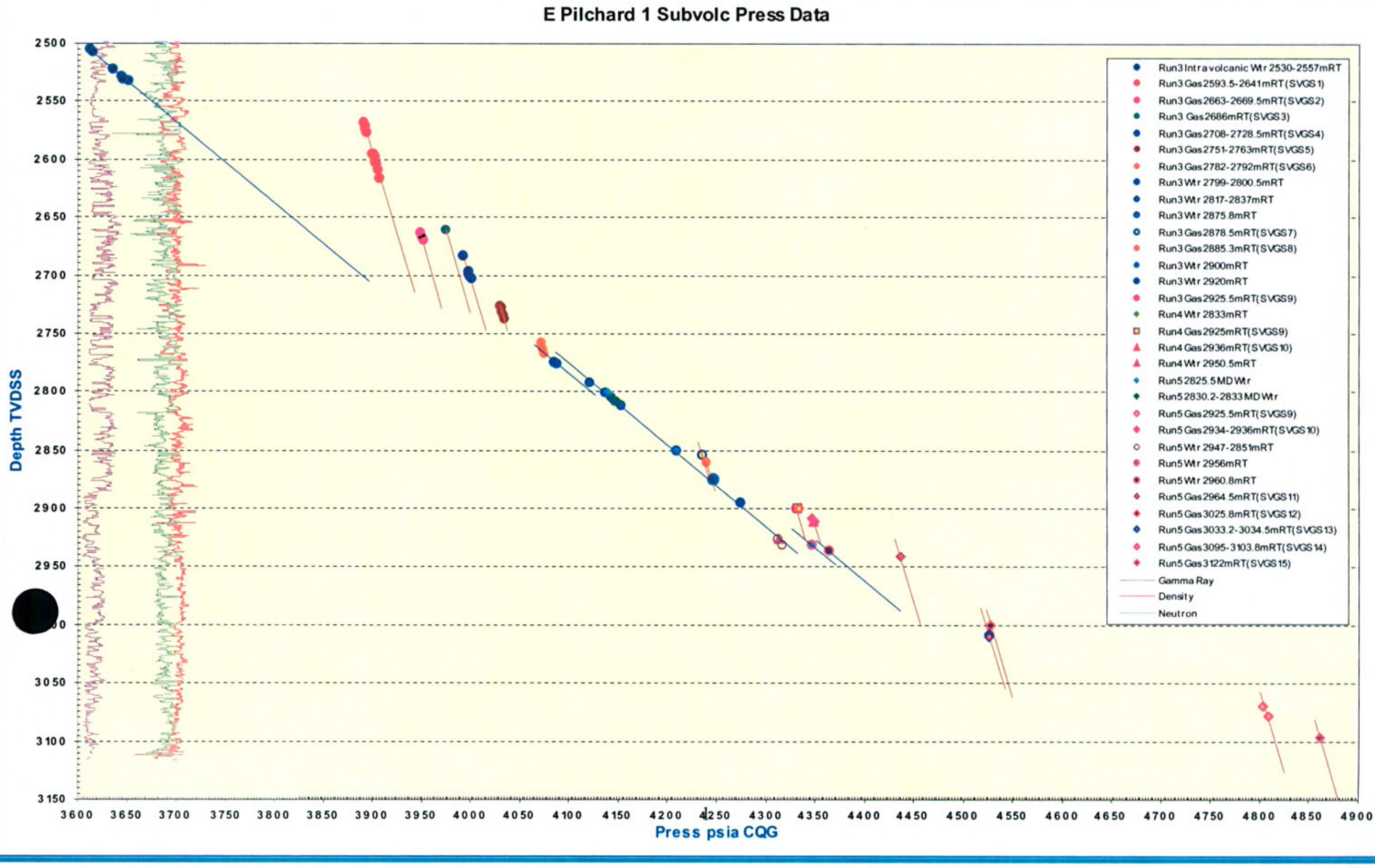


TABLE OF CONTENTS

SUMMARY

Schlumberger's MDT was used in obtaining formation pressures and fluid samples in East Pilchard 1. A total of 178 pressure tests and 22 fluid samples were attempted with 20 successful gas recoveries.
The pressure data indicates that the water sands from the top of porosity down to 2212mRT(2187mSS) are in one fluid system. The water gradient is about 1.45psi/m (0.44psi/ft) and is similar to the water gradients found in the other parts of the basin. At least 4 pressure systems are interpreted in the water bearing sands that extend from 2212mRT(2187mSS) to the top of volcanics at 2432mRT(2407mSS). The sandstones between the volcanic layers are also water bearing and appear to be in separate system and the position of the gradient is almost the same as that of the sands above 2212mRT. All the water sands above and in the intra-volcanics have been affected by production in the basin, some more than others have. The different positions of the water gradients suggest either that some of the sands have been drawn down more than others or that these sands have poorer aquifer support.
In the reservoirs below volcanics at least 15 gas and 3 aquifer systems have been identified by the pressure data. Because of the uncertainty of the position of the water gradients it is very difficult to interpret gas-water contacts and column heights. It is likely that the gas column heights are very variable.
Gas analysis indicates that there is very little difference in the gas composition from sand to sand. The gas as gradient is estimated to be 0.354 psi/m or 0.108psi/ft, with a carbon dioxide content that varies from about 11% to about 22%

1.0 Operational Summary

Schlumberger's MDT (Modular Dynamic Tester) was used to obtain formation pressures and fluid samples in the East Pilchard 1 exploration well. The tool was run with the following modules:

Single large area probe with large area packer
Pump-out
Optical Fluid Analyser (OFA)
2 X Multi-chamber module (MRMS)
2 X 1-gallon chambers

A total of 5 MDT runs were made and 178 pressure tests were attempted. A total of 22 fluid samples at 15 depth points were obtained. Several problems were encountered with the MDT and these are detailed in the Field Wireline Logging Reports (Appendix 3) of the Quantitative Petrophysical Interpretation report. Onsite gas analyses were carried for gas composition was carried out by ACS Laboratories. Onshore gas analysis was also carried out by Petrolab.

2.0 Pressure Data Observation and Interpretation

2.1 Top of Porosity to Intra-Volcanics

The MDT data is presented in Tables 2.1, 2.2 and 2.3. Fig.2.1 is a plot of the pressure data from the top of porosity at 1687.8mRT (1662.8mSS) down to the base of the first gas system below the volcanics at 2641mRT (2616mSS). All the pressure data shown is from the crystal quartz gauge or CQG. The reservoirs from the top of porosity to the top of first volcanic layer (Volcanic Layer 1) at 2432mRT (2407mSS) are water bearing. The pressure data as shown by Fig.2.1 suggests that these water bearing reservoirs appear to belong to several pressure systems with a clear pressure discontinuity at 2212mRT (2187mSS). The sands above this depth appear to belong to one pressure system whereas those below this depth appears to be in at least 4 systems. The water gradient of this system is 1.45psi/m (0.44psi/ft) and is similar to those gradients in the other parts of the Gippsland Basin. It is likely all the reservoirs above the Volcanic Layer 1 were once in the same pressure system but now appear to belong to several systems as a result of production in the basin. The differences in the position of the water gradients could be ascribed to the fact that some sands have been drawn down more than others (higher offtake in these sands than others) or that they have poorer aquifer support.
The pressure data indicates that water bearing sands between the volcanic layers appear to be in a separate pressure system and the position of this gradient almost matches that of the water sands above 2212mRT (2187mSS). This observation suggests that these reservoirs have been affected by the production in the basin but not to same extent as those between 2212mRT and Volcanic Layer 1.

2.2 Sub-Volcanics

Fig. 2.2 is a plot of the pressure data predominantly from the reservoirs below the volcanic layers. The pressure data suggest that there are at least 15 gas and 3 aquifer systems. With the exception of a few gas-bearing reservoirs, no attempt is made to interpret possible gas-water contacts and gas column heights in this report, because of the uncertainty in the position of the water gradients.
As shown by Fig. 2.2 and Fig. 2.3 the first gas system below the volcanics or SVGS1 (for the purpose of this report all the gas sands below the volcanics are referred to as Sub-Volcanic Gas System or SVGS) extends from 2592.2mRT to 2644.5mRT.

PE908923_color009

908923 040

ESSO AUSTRALIA PTY LTD

Well: East Pilchard - 1
Date
Tool Type (MDT-GR-LEHQT)
Gauge Type: CQG
Pressure units (psia, psig)

Geologist-Engineer M.Woodmansee / A.Ribeiro
KB (metres) 25.0
Probe type Large
Temperature units (degF, degC) Deg C

Sample No	Depth mRT	Depth mSS	Strain Gauge (SG) Hydrostatic before psig	PPG	Reservoir psig	PPG	Quartz Gauge (CQG) Hydrostatic psia	PPG	Reservoir psia	PPG	Temp deg C	SG hyd after	CQG hyd after	Comments	Mobility
Suite 1 Run 3															
1	1689.03	1663.94	2952.00	10.3	2369.90	8.3584	2942.50	10.2	2362.68	8.33	74.90	2952.70	2943.90	20cc DD	549.7
2	1694.47	1669.38	2962.20	10.3	2381.90	8.3733	2953.50	10.2	2374.87	8.35	75.83	2962.30	2953.14	20cc DD	1238.0
3	1709.54	1684.44	2987.70	10.3	2405.50	8.3807	2979.27	10.2	2398.61	8.36	76.45	2988.10	2979.23	20cc DD	4421.0
4	1732.01	1706.91	3026.70	10.3	2436.20	8.3759	3017.70	10.2	2429.21	8.35	77.25	3026.20	3017.50	20cc DD	1953.4
5	1748.53	1723.42	3054.60	10.3	2463.10	8.3873	3046.20	10.2	2455.80	8.36	78.09	3054.60	3045.69	20cc DD	503.2
6	1799.02	1773.89	3141.20	10.2	2948.60	9.7548	3132.70	10.2	2541.34	8.41	79.03	3141.30	3132.50	20cc DD	1876.0
7	1812.01	1786.88	3163.80	10.2	2567.10	8.431	3154.90	10.2	2559.81	8.41	79.65	3163.60	3154.94	20cc DD	2079.0
8	1876.03	1850.88	3273.80	10.2	2657.90	8.4273	3265.40	10.2	2650.44	8.40	80.45	3273.90	3264.98	20cc DD	3282.0
9	1908.98	1883.80	3330.40	10.2	2704.90	8.4265	3321.80	10.2	2697.22	8.40	81.20	3330.70	3321.40	20cc DD	3052.0
10	1933.49	1908.31	3372.70	10.2	2737.70	8.4191	3363.60	10.2	2729.80	8.39	82.23	3372.70	3363.30	20cc DD	1104.0
11	1936.95	1911.76	3378.70	10.2	2742.50	8.4187	3369.40	10.2	2734.76	8.39	83.23	3378.40	3369.32	20cc DD	866.0
12	1966.86	1941.66	3429.90	10.2	2774.00	8.3842	3421.20	10.2	2766.21	8.36	83.84	3430.10	3420.70	20cc DD, Correlate	2050.0
13	1978.36	1953.15	3449.60	10.2	2790.40	8.3842	3440.50	10.2	2783.38	8.36	84.60	3449.30	3440.30	20cc DD	929.0
14	1991.95	1966.74	3472.80	10.2	2811.70	8.3898	3464.00	10.2	2803.78	8.37	84.95	3473.00	3463.60	20cc DD	2365.0
15	2038.51	2013.27	3552.50	10.2	2889.60	8.423	3543.60	10.2	2881.41	8.40	85.47	3552.80	3543.40	20cc DD	3561.6
16	2053.98	2028.74	3579.60	10.2	2911.30	8.4215	3570.30	10.2	2903.33	8.40	85.88	3579.60	3570.10	20cc DD	2833.3
17	2119.00	2094.00	3691.30	10.2	3004.40	8.42	3681.75	10.2	2996.11	8.40	86.48	3691.10	3681.70	20cc DD, Mobility later	913.1
18	2141.50	2116.21	3729.60	10.2	3036.40	8.4204	3720.70	10.2	3028.21	8.40	87.18	3729.90	3720.50	20cc DD	408.8
19	2152.00	2127.00	3747.70	10.2	3051.20	8.4185	3738.77	10.2	3043.13	8.40	87.94	3748.00	3738.60	20cc DD Restart computer	887.3
20	2212.03	2186.70	3850.70	10.2	3136.20	8.4168	3841.70	10.2	3127.70	8.39	89.17	3850.80	3841.70	20cc DD, set probe twice	107.6
21	2305.02	2279.64	4009.80	10.2	3144.90	8.096	4000.80	10.2	3136.71	8.07	90.35	4009.80	4000.40	20cc DD	528.6
22	2345.04	2319.64	4078.80	10.2	3218.50	8.1426	4069.60	10.2	3210.00	8.12	91.30	4078.70	4069.20	20cc DD	71.5
23	2377.04	2351.62	4133.40	10.2	3283.50	8.1941	4124.50	10.2	3274.97	8.17	92.00	4133.70	4123.90	20cc DD	818.9
24	2390.00	2364.57	4156.00	10.2	3322.20	8.2453	4146.60	10.2	3313.70	8.22	92.60	4156.00	4146.30	20cc DD	95.3
25	2397.50	2372.06	4168.80	10.2	3333.30	8.2467	4159.80	10.2	3324.80	8.23	93.33	4168.40	4159.40	20cc DD	197.4
26	2413.51	2388.07	4196.10	10.2	3354.90	8.2445	4187.50	10.2	3346.46	8.22	94.03	4196.30	4187.00	20cc DD	632.7
27	2530.02	2504.49	4396.50	10.2	3621.60	8.4862	4387.20	10.2	3612.64	8.47	95.00	4396.20	4386.80	20cc DD	257.7
28	2532.51	2506.99	4400.50	10.2	3624.80	8.4852	4391.50	10.2	3615.80	8.46	95.55	4400.70	4391.20	20cc DD	52.7
29	2547.01	2521.48	4425.70	10.2	3644.90	8.4832	4416.50	10.2	3635.50	8.46	96.15	4426.50	4416.40	20cc DD	74.5
30	2553.49	2527.95	4436.70	10.2	3653.20	8.4808	4427.70	10.2	3644.50	8.46	96.78	4436.60	4427.60	20cc DD	1040.4
31	2554.99	2529.45	4439.50	10.2	3655.20	8.4804	4430.50	10.2	3646.65	8.46	97.47	4438.80	4430.20	20cc DD	3.4
32	2557.03	2531.49	4443.20	10.2	3661.10	8.4872	4433.90	10.2	3651.90	8.47	98.13	4443.60	4433.50	20cc DD	4.2
33	2555.49	2529.96	4440.40	10.2	3656.10	8.4808	4431.40	10.2	3646.90	8.46	98.55	4440.70	4430.98	20cc DD	168.4
34	2593.53	2567.98	4506.00	10.2	3900.00	8.9126	4496.80	10.2	3891.01	8.89	98.70	4506.20	4496.60	20cc DD	1519.5
35	2596.05	2570.49	4510.50	10.2	3900.90	8.9059	4501.30	10.2	3892.07	8.89	99.15	4510.50	4501.70	20cc DD	847.2
36	2598.01	2572.45	4514.10	10.2	3901.70	8.901	4504.80	10.2	3892.68	8.88	99.69	4514.20	4504.80	20cc DD GR correlate	232.0
37	2601.99	2576.43	4521.50	10.2	3903.30	8.8909	4511.30	10.2	3893.53	8.87	99.63	4521.40	4511.60	20cc DD	1587.1
38	2619.98	2594.42	4551.50	10.2	3909.30	8.8428	4542.60	10.2	3900.52	8.82	98.73	4551.70	4542.80	20cc DD - Temporary Lost Seal	23.2
39	2619.98	2594.42	4551.50	10.2	3909.10	8.8423	4542.60	10.2	3900.30	8.82	99.21	4551.60	4542.80	20cc DD Pretest redone	41.5
40	2623.01	2597.45	4556.60	10.2	3911.60	8.8377	4548.60	10.2	3902.97	8.82	99.58	4556.60	4547.95	20cc DD, Aborted	4.9
41	2627.51	2601.94	4564.60	10.2	3911.40	8.822	4555.90	10.2	3902.64	8.80	100.32	4564.70	4556.00	20cc DD	1768.0
42	2629.01	2603.44	4567.40	10.2	3912.90	8.8203	4558.20	10.2	3903.65	8.80	100.70	4567.50	4558.20	20cc DD	61.2
43	2633.51	2607.93	4575.30	10.2	3915.00	8.8098	4565.30	10.2	3905.69	8.79	100.86	4575.30	4566.20	20cc DD	2.2
44	2641.00	2615.42	4588.30	10.2	3916.00	8.7868	4579.30	10.2	3907.15	8.77	101.32	4588.30	4579.50	20cc DD	46.5
45	2642.50	2616.92	4590.70	10.2	n/a	n/a	4581.50	10.2	n/a	n/a	101.27	4590.90	4581.50	20cc DD - Tight, GR correlate	
46	2644.01	2618.43	4593.50	10.2	n/a	n/a	4583.70	10.2	n/a	n/a	100.67	n/a	n/a	20cc DD - Lost seal twice	
47	2642.47	2616.89	4590.50	10.2	n/a	n/a	4581.20	10.2	n/a	n/a	99.92	n/a	n/a	20cc DD - Tight	
48	2649.92	2624.33	4603.20	10.2	n/a	n/a	4593.70	10.2	n/a	n/a	100.33	n/a	n/a	20cc DD - Tight	
49	2649.80	2637.41	4603.30	10.2	n/a	n/a	4593.70	10.2	n/a	n/a	100.88	n/a	n/a	20cc DD - Lost seal	
50	2663.00	2641.44	4626.50	10.2	3958.60	8.7949	4616.30	10.2	3949.30	8.77	101.03	4625.70	4616.50	20cc DD	31.8

Table 2.1

PE908923_colorΦ1Φ

908923 041

ESSO AUSTRALIA PTY LTD

Well: East Pilchard - 1
Date
Tool Type (MDT-GR-LEHQT)
Gauge Type: CQG
Pressure units (psia, psig)

Geologist-Engineer: M.Woodmansee / A.Ribeiro
KB (metres): 25.0
Probe type: Large
Temperature units (degF, degC): Deg C

Sample No	Depth mRT	Depth mSS	Strain Gauge (SG) Hydrostatic before psig	PPG	Reservoir psig	PPG	Quartz Gauge (CQG) Hydrostatic psia	PPG	Reservoir psia	PPG	Temp deg C	SG hyd after	CQG hyd after	Comments	Mobility
Suite 1 Run 3															
51	2667.04	2643.97	4632.60	10.2	3959.80	8.7892	4623.30	10.2	3950.63	8.77	101.30	4632.40	4623.20	20cc DD	429.8
52	2669.50	2644.50	4636.50	10.2	3960.60	8.7892	4627.48	10.2	3951.37	8.77	101.83	4637.00	4627.05	20cc DD	18.4
53	2672.51	2646.91	4642.10	10.2	n/a	n/a	4632.54	10.2	n/a	n/a	102.20	4641.90	4632.50	20cc DD - Tight	
54	2686.03	2660.42	4664.80	10.2	3984.50	8.7893	4655.68	10.2	3975.14	8.77	102.69	4664.70	4655.20	20cc DD	84.9
55	2691.51	2665.90	4674.10	10.2	n/a	n/a	4664.81	10.2	n/a	n/a	102.56	4674.30	4664.60	20cc DD - Tight	
56	2700.00	2675.00	4688.70	10.2	n/a	n/a	4679.56	10.2	n/a	n/a	103.09	4688.60	4679.54	20cc DD - Lost seal	
57	2708.49	2682.86	4702.90	10.2	4002.20	8.7545	4693.98	10.2	3992.90	8.73	103.04	4702.80	4693.60	10cc DD - Slow buildup	22.1?
58	2719.53	2693.90	4722.40	10.2	n/a	n/a	4713.14	10.2	n/a	n/a	103.30	4722.30	4712.40	10cc DD - Tight	
59	2721.49	2695.85	4725.30	10.2	4007.10	8.723	4716.02	10.2	3997.58	8.70	103.69	4725.50	4715.80	20cc DD	92.5
60	2724.02	2698.38	4729.50	10.2	4008.20	8.7172	4720.50	10.2	3998.82	8.70	103.81	4729.50	4720.50	20cc DD	21.5
61	2726.53	2700.89	4734.30	10.2	4009.00	8.7108	4724.68	10.2	3999.40	8.69	104.08	4734.50	4724.50	20cc DD	87.6
62	2728.54	2702.90	4737.80	10.2	4010.00	8.7065	4727.60	10.2	4000.44	8.69	104.04	4737.70	4727.79	20cc DD	342.1
63	2741.50	2715.86	4759.90	10.2	n/a	n/a	4750.50	10.2	n/a	n/a	103.94	4759.40	4750.70	20cc DD - Tight	
64	2751.01	2725.36	4775.70	10.2	4038.70	8.6966	4767.16	10.2	4030.11	8.68	104.58	4775.50	4767.39	20cc DD	1167.3
65	2753.00	2727.34	4778.80	10.2	4039.70	8.6924	4770.50	10.2	4031.04	8.67	104.95	4779.10	4770.82	20cc DD	3.9
66	2755.99	2730.33	4784.40	10.2	4040.60	8.6848	4775.68	10.2	4031.91	8.67	105.51	4784.30	4775.73	20cc DD	248.8
67	2758.99	2733.33	4789.50	10.2	4042.50	8.6794	4780.65	10.2	4033.57	8.66	105.85	4789.70	4780.70	20cc DD	191.5
68	2763.04	2737.38	4796.50	10.2	4043.40	8.6685	4787.80	10.2	4034.60	8.65	105.88	4796.60	4787.80	10cc DD - Leak in packer to probe. Retest	
69	2763.04	2737.38	4796.90	10.2	4043.20	8.668	4787.90	10.2	4034.28	8.65	105.88	4796.90	4787.71	10cc DD	1826.2
70	2782.01	2756.33	4829.20	10.2	4080.40	8.6876	4820.48	10.2	4071.52	8.67	105.99	4829.40	4820.57	20cc DD	5.8
71	2784.02	2758.33	4832.40	10.2	4080.80	8.6822	4823.78	10.2	4072.21	8.66	106.46	4832.60	4823.79	20cc DD	391.2
72	2789.01	2763.32	4841.20	10.2	4082.30	8.6697	4832.64	10.2	4073.69	8.65	106.50	4840.60	4832.27	15cc DD	511.8
73	2792.02	2766.32	4846.40	10.2	4083.40	8.6626	4837.60	10.2	4074.69	8.64	107.08	4846.30	4837.50	15cc DD	1586.6
74	2799.50	2773.80	4859.50	10.2	4094.30	8.6623	4849.90	10.2	4085.27	8.64	107.08	4859.50	4850.40	10cc DD	43.5
75	2800.50	2774.79	4860.90	10.2	4096.20	8.6633	4852.11	10.2	4087.40	8.64	106.40	4861.30	4852.19	10cc DD - poor gauge stability	39.4
76	2817.47	2791.75	4890.40	10.2	4130.10	8.6819	4881.29	10.2	4121.50	8.66	106.77	4889.90	4881.50	20cc DD	14.7
77	2825.52	2799.78	4903.90	10.2	4146.00	8.6903	4895.82	10.2	4137.50	8.67	106.84	4903.40	4895.62	20cc DD	93.8
78	2829.98	2804.25	4911.50	10.2	4151.40	8.6878	4903.40	10.2	4143.15	8.67	107.60	4911.60	4903.25	20cc DD	352.5
79	2832.99	2807.25	4916.80	10.2	4155.70	8.6875	4908.60	10.2	4147.28	8.67	107.82	4196.60	4908.59	20cc DD	122.8
80	2836.97	2811.23	4923.80	10.2	4161.30	8.6869	4915.53	10.2	4152.69	8.67	108.35	4923.90	4915.30	15cc DD	77.2
81	2860.98	2835.21	4965.40	10.2	n/a	n/a	4956.90	10.2	n/a	n/a	109.44	4965.10	4956.83	15cc DD - aborted, slow buildup, retest	
82	2861.20	2835.43	4966.20	10.2	4231.80	8.7586	4957.10	10.2	4222.70	8.74	109.32	4966.10	4957.38	5cc DD (+5cc + 2cc), seal leaked immediately after taking pressure	
83	2875.45	2849.66	4990.40	10.2	n/a	n/a	4981.90	10.2	n/a	n/a	109.70	n/a	n/a	15cc DD - aborted, slow buildup, retest	
84	2875.77	2849.99	4991.40	10.2	4218.30	8.6861	4982.40	10.2	4209.63	8.67	109.90	4991.30	4982.77	10cc DD (+5cc DD)	33.2
85	2878.51	2852.72	4996.00	10.2	4243.70	8.73	4987.50	10.2	4235.05	8.71	110.19	4996.10	4987.70	15cc DD (+5cc DD)	25.3
86	2882.01	2856.22	5002.20	10.2	n/a	n/a	4993.77	10.2	n/a	n/a	110.46	n/a	n/a	10cc DD - no seal, retest 1m higher	
87	2881.08	2855.29	5000.50	10.2	n/a	n/a	4992.30	10.2	n/a	n/a	110.54	n/a	n/a	20cc DD - Tight, aborted	
88	2885.31	2859.52	5008.10	10.2	4248.60	8.7193	4999.32	10.2	4239.50	8.70	110.76	5008.20	4999.20	10cc DD	48.6
89	2900.52	2874.71	5034.80	10.2	4255.50	8.6873	5025.80	10.2	4246.62	8.67	110.67	5034.80	5025.90	10cc DD	9.0
90	2918.46	2892.63	5065.40	10.2	n/a	n/a	5057.77	10.2	n/a	n/a	110.81	n/a	n/a	10cc DD - aborted, slow buildup, suspect leaking	
91	2920.47	2894.64	5069.50	10.2	4283.40	8.6841	5061.22	10.2	4274.60	8.67	111.28	5070.00	5060.82	10cc DD additional 5cc DD to reconfirm	22.4
92	2925.00	2899.17	5077.70	10.2	n/a	n/a	5069.26	10.2	n/a	n/a	111.74	n/a	n/a	10cc DD (+5cc DD) - aborted, slow buildup, possible leak	
93	2926.51	2900.68	5080.30	10.2	n/a	n/a	5071.79	10.2	n/a	n/a	112.05	n/a	n/a	20cc DD - aborted, tight, try 1m higher	
94	2925.53	2899.69	5078.80	10.2	4339.50	8.7825	5070.32	10.2	4330.59	8.76	112.38	5078.60	5070.00	10cc DD (+5cc DD), sample diverted to OFA then to 1 Gallon chamber	11.8

Table 2.1 Continued

ESSO AUSTRALIA PTY LTD

Well: East Pilchard - 1
Date: 27 - 28 July 2001
Tool Type (MDT-GR-LEHQT)
Gauge Type: CQG
Pressure units (psia, psig)

Geologist-Engineer: M.Woodmansee / A.Ribeiro
KB (metres): 25 m
Probe type: large
Temperature units: (degC)

Sample No	Depth mRT	Depth mSS	Strain Gauge (SG)				Quartz Gauge (CQG)					SG	CQG	Comments	Mobility
			Hydrostatic before psig	PPG	Reservoir psig	PPG	Hydrostatic psia	PPG	Reservoir psia	PPG	Temp deg C	hyd after	hyd after		
Suite 1 Run 4															
95	2593.50	2568.5	4510.40	10.2	3877.40	8.8591	4525.20	10.2	**3891.22**	8.89	88.37	4510.30	4523.10	20cc DD Collect 1 gallon (MPSC-BB-119) and 450cc (MPSC-0157)	**1737.0**
96	2596.00	2571.0	4513.70	10.2	3877.90	8.8517	4527.50	10.2	**3891.80**	8.88	94.24	4512.50	4526.20	20cc DD Collect 450cc (MPSR-0193)	**323.0**
97	2602.00	2577.0	4523.00	10.2	3879.90	8.8356	4536.55	10.2	**3893.42**	8.87	95.03	4521.80	4535.60	20cc DD Sample chamber empty	**3167.0**
98	2627.50	2602.5	4565.30	10.2	3888.60	8.7687	4579.30	10.2	**3902.37**	8.80	95.45	4563.70	4577.70	20cc DD Collect 450cc (MPSR-0501) and 450cc (MPSR-0123)	**262.6**
99	2641.00	2616.0	4587.70	10.2	3893.20	8.7337	4601.25	10.2	**3907.07**	8.76	94.57	4586.70	4600.50	20cc DD Sample chamber empty	**178.1**
100	2602.00	2577.0	4518.40	10.2	3880.80	8.8377	4533.90	10.2	**3895.14**	8.87	92.21	4590.20	4531.70	15cc DD Sample Chamber empty	**666.9**
101	2627.50	2602.5	4562.20	10.2	3889.00	8.7696	4575.70	10.2	**3902.75**	8.80	99.85	4560.40	4574.50	15cc DD Collect 450cc (MPSR-0123)	**131.5**
Siite 1 Run 4A															
102	2641.00	2616.0	4584.40	10.2	n/a	n/a	4598.02	10.2	**n/a**	n/a	100.20	4583.60	4597.50	15cc DD - Lost seal, second attempt tight.	
103	2641.30	2616.3	4584.10	10.2	3893.80	8.7341	4597.67	10.2	**3907.21**	8.76	100.10	4584.80	4597.62	15cc DD Build up to slow to sample	**0.8**
104	2640.80	2615.8	4583.50	10.2	n/a	n/a	4597.30	10.2	**n/a**	n/a	100.16	4584.50	4597.35	15cc DD - Tight. GR correlated.	**16.1**
105	2641.00	2616.0	4585.00	10.2	3893.90	8.7353	4597.74	10.2	**3906.70**	8.76	99.89	4582.70	4596.45	15cc DD Collect 450cc (MPSR-156)	**108.7**
106	2663.00	2638.0	4620.60	10.2	n/a	n/a	4634.79	10.2	**n/a**	n/a	99.57	4621.10	4634.40	15cc DD - Tight test aborted	**3.9**
107	2663.20	2638.2	4621.10	10.2	3935.60	8.7545	4635.35	10.2	**3949.83**	8.79	100.40	4619.70	4633.35	15cc DD Sample Chamber empty	**35.6**
108	2667.50	2642.5	4627.10	10.2	3936.90	8.7432	4640.80	10.2	**3950.74**	8.77	101.87	4626.30	4640.60	15cc DD, Collect sample 450cc (MPSR-503)	**2.0**
109	2724.00	2699.0	4724.10	10.2	n/a	n/a	4737.87	10.2	**n/a**	n/a	103.30	4723.80	4737.40	15cc DD abort tight	
110	2724.50	2699.5	4724.90	10.2	3985.20	8.6636	4738.90	10.2	**3998.99**	8.69	103.77	4724.90	4738.85	15cc DD Pre-Test only	**7.8**
111	2726.50	2701.5	4728.70	10.2	3985.70	8.6582	4742.57	10.2	**3999.45**	8.69	104.04	4729.30	4742.66	15cc DD + 5cc DD Pre-Test only	**161.3**
112	2728.50	2703.5	4732.40	10.2	3986.60	8.6538	4746.11	10.2	**4000.22**	8.68	104.49	4731.60	4755.70	15cc DD Collect 1 gallon (MPSC-BB-105) and 450cc (MPSR-487)	**103.3**
113	2756.00	2731.0	4779.90	10.2	4017.60	8.6333	4793.50	10.2	**4031.38**	8.66	105.35	4779.40	4793.47	15cc DD, Collect 450cc sample (MPSR-478)	**336.3**
114	2759.00	2734.0	4785.20	10.2	4018.80	8.6264	4799.10	10.2	**4032.30**	8.66	106.67	4784.70	4798.60	15cc DD OFA Analysis only	**353.3**
115	2763.00	2738.0	4792.20	10.2	n/a	n/a	4805.50	10.2	**n/a**	n/a	106.88	n/a	n/a	15cc DD + 5cc DD Aborted supercharged	
116	2763.50	2738.5	4793.30	10.2	n/a	n/a	4806.90	10.2	**n/a**	n/a	106.50	n/a	n/a	15cc DD aborted leaking seal	
117	2763.50	2738.5	4793.70	10.2	4020.70	8.6163	4807.20	10.2	**4035.30**	8.65	106.60	4792.90	4806.42	20cc DD OFA Analysis only	**73.2**
118	2792.00	2767.0	4842.70	10.2	4060.80	8.6126	4856.40	10.2	**4074.30**	8.64	107.70	invalid	4856.50	20cc DD Collect 450cc sample (MPSR-187) and 450cc (MPSR-477)	**322.9**
119	2885.00	2860.0	invalid	invalid	invalid	invalid	5017.50	10.2	**n/a**	n/a	108.33	n/a	5017.70	20cc DD, tight,test aborted	
120	2885.40	2860.4	invalid	invalid	invalid	invalid	5017.95	10.2	**4240.50**	8.70	108.90	invalid	5017.90	15cc DD OFA Analysis only	**4.5**

Table 2.2

ESSO AUSTRALIA PTY LTD

Well: East Pilchard - 1
Date 27 - 28 July 2001 | Geologist-Engineer: M Woodmansee / A Ribeiro
Tool Type (MDT-GR-LEHQT) | KB (metres): 25 m
Gauge Type: CQG | Probe type: large
Pressure units (psia, psig) | Temperature: Deg C

Sample No	Depth mRT	Depth mSS	Strain Gauge (SG) Hydrostatic before psig	PPG	Reservoir psig	PPG	Quartz Gauge (CQG) Hydrostatic psia	PPG	Reservoir psia	PPG	Temp deg C	SG hyd after	CQG hyd after	Comments	Mobility
											Suite 2 Run 3				
121	2825.50	2800.5	4889.80	10.2	n/a	n/a	4909.38	10.2	n/a	n/a	97.63	n/a	n/a	20cc DD, (GR coorelate)dry test	
122	2833.00	2808.0	4902.80	10.2	4127.90	8.6271	4921.30	10.2	4146.50	8.67	99.80	4902.60	4920.90	20cc DD	404.2
123	2825.64	2800.6	4893.70	10.2	n/a	n/a	4907.70	10.2	n/a	n/a	101.25	n/a	n/a	20cc DD Dry test	
124	2829.99	2805.0	4901.60	10.2	n/a	n/a	4915.30	10.2	n/a	n/a	101.03	n/a	n/a	20cc DD (GR coorelate)Dry test	
125	2830.33	2805.3	4901.60	10.2	n/a	n/a	4915.70	10.2	n/a	n/a	101.24	n/a	n/a	20cc DD. Lost seal	
126	2885.31	2860.3	4995.00	10.2	n/a	n/a	5009.70	10.2	n/a	n/a	101.50	n/a	n/a	20cc DD. Lost seal	
127	2885.14	2860.1	4994.50	10.2	n/a	n/a	5009.70	10.2	n/a	n/a	101.81	n/a	n/a	20cc DD. Dry test	
128	2925.46	2900.5	5063.30	10.2	4317.70	8.7361	5078.60	10.2	4332.90	8.77	102.50	5063.50	5078.30	20 cc DD	12.7
129	2926.83	2901.8	5066.30	10.2	n/a	n/a	5080.90	10.2	n/a	n/a	103.00	5066.30	5080.40	20 cc. (Tight wait 5 minutes for stabilisation)	0.2
130	2933.92	2908.9	5078.40	10.2	n/a	n/a	5092.40	10.2	n/a	n/a	103.88	n/a	n/a	15cc DD (GR co-orelate) Dry test	
131	2936.62	2911.6	5082.90	10.2	4335.20	8.7379	5096.80	10.2	4349.14	8.77	103.90	5082.40	5096.80	15cc DD	9.4
132	2947.59	2922.6	5101.40	10.2	n/a	n/a	5115.81	10.2	n/a	n/a	104.17	n/a	n/a	15cc DD. Dry test	
133	2947.78	2922.8	5101.70	10.2	n/a	n/a	5115.80	10.2	n/a	n/a	104.71	n/a	n/a	15cc DD. Dry test	
134	2936.56	2911.6	5082.40	10.2	4335.40	8.7384	5096.40	10.2	4348.90	8.77	105.22	5081.70	5096.16	**15cc DD. Retest to check Schlumberger toolat no charge**	12.2
135	2947.80	2922.8	5101.00	10.2	n/a	n/a	5115.50	10.2	n/a	n/a	104.90	n/a	n/a	**5cc DD. Reduce the pretest drawdown rate to 20cc/min from 60cc/min - no charge**	
136	2950.53	2925.5	5105.40	10.2	4299.90	8.6255	5119.80	10.2	4314.17	8.65	105.15	5105.90	5119.90	15cc DD, rate 20cc/min	409.6
137	2956.20	2931.2	5115.00	10.2	n/a	n/a	5129.40	10.2	n/a	n/a	105.37	n/a	n/a	15cc DD. Dry test	
											Suite 2 Run 5				
138	2825.50	2800.5	4888.40	10.2	4125.30	8.6447	4903.30	10.2	4140.03	8.68	101.30	4891.10	4902.90	20cc DD Temperature not completely stable	46.8
139	2830.20	2805.2	4898.50	10.2	4130.40	8.6409	4912.07	10.2	4143.20	8.67	105.82	4898.70	4911.12	20cc DD	157.2
140	2833.00	2808.0	4901.40	10.2	4132.10	8.6358	4916.11	10.2	4148.34	8.67	106.90	4901.10	4950.50	15cc DD +5ccDD	104.3
141	2925.50	2900.5	5061.80	10.2	4319.60	8.7398	5075.59	10.2	4333.60	8.77	108.24	5061.60	5075.20	20cc DD	24.3
142	2926.80	2901.8	5064.00	10.2	4335.80	8.7686	5077.50	10.2	4348.06	8.79	109.34	5064.30	5077.07	20cc DD	3.3
143	2934.00	2909.0	5076.60	10.2	4333.70	8.7427	5090.40	10.2	4347.20	8.77	110.90	5076.50	5089.60	20cc DD	14.0
144	2936.60	2911.6	5079.90	10.2	4332.30	8.7321	5095.50	10.2	4350.36	8.77	111.08	5079.70	5094.30	20cc DD	114.1
145	2947.60	2922.6	5098.80	10.2	4296.50	8.6273	5113.90	10.2	4312.94	8.66	111.86	5098.90	5112.90	20 cc DD	212.1
146	2950.80	2925.8	5104.60	10.2	4301.10	8.6271	5119.34	10.2	4316.38	8.66	112.52	5104.80	5118.86	20cc DD	385.1
147	2956.00	2931.0	5113.80	10.2	4332.30	8.6743	5128.37	10.2	4346.46	8.70	113.24	n/a	5128.00	20cc DD Strain gauge failed	30.6
148	2960.80	2935.8	n/a	n/a	n/a	n/a	5136.45	10.2	4363.85	8.72	113.72	n/a	5136.07	20cc DD	8.0
149	2965.00	2940.0	n/a	n/a	4421.70	8.8262	5143.78	10.2	4436.30	8.86	113.98	5129.30	5143.70	20cc DD re-set packer 20cc DD suspect pressure response mve up 0.5m	83.7
150	2965.50	2940.5	5130.10	10.2	4421.90	8.8251	5144.57	10.2	4436.56	8.85	114.28	n/a	5144.65	20cc DD collect 2 X 450cc MRSM chambers 38min build up	30.3
151	3025.00	3000.0	n/a	n/a	n/a	n/a	5247.38	10.2	n/a	n/a	114.12	n/a	5247.00	20cc DD tight to slow build up	n/a
152	3025.20	3000.2	n/a	n/a	n/a	n/a	5247.70	10.2	n/a	n/a	114.56	n/a	5247.60	10cc DD tight to slow build up	0.9
153	3025.80	3000.8	n/a	n/a	n/a	n/a	5248.70	10.2	4528.19	8.86	115.24	n/a	5248.65	10cc DD	2.0
154	3027.20	3002.2	n/a	n/a	n/a	n/a	5251.25	10.2	n/a	n/a	115.90	n/a	5251.90	10ccDD tight to slow build up	
155	3027.50	3002.5	n/a	n/a	n/a	n/a	5251.70	10.2	n/a	n/a	116.42	n/a	5251.40	10cc DD +5cc DD Super charged	
156	3028.40	3003.4	n/a	n/a	n/a	n/a	5253.40	10.2	n/a	n/a	116.87	n/a	5253.30	10cc DD tight to slow build up tight	
157	3033.20	3008.2	n/a	n/a	n/a	n/a	5261.60	10.2	4526.00	8.83	117.19	n/a	5261.60	10cc DD	1.3
158	3035.10	3010.1	n/a	n/a	n/a	n/a	5264.80	10.2	n/a	n/a	117.39	n/a	5264.80	10cc DD, tight move up 0.5m and retest	
159	3034.50	3009.5	n/a	n/a	n/a	n/a	5263.80	10.2	4526.67	8.83	117.61	n/a	5263.67	10 cc DD lost seal +5ccDD ok	7.2
160	3047.90	3022.9	n/a	n/a	n/a	n/a	5286.60	10.2	n/a	n/a	117.70	n/a	5286.80	10cc DD tight	
161	3074.50	3049.5	n/a	n/a	n/a	n/a	5331.70	10.2	n/a	n/a	117.19	n/a	5331.90	20cc DD to tight to sample	
162	3074.70	3049.7	n/a	n/a	n/a	n/a	5332.30	10.2	n/a	n/a	117.89	n/a	5332.10	10cc DD tight	
163	3074.30	3049.3	n/a	n/a	n/a	n/a	5331.60	10.2	4774.00	9.19	118.35	n/a	5331.50	10cc DD probably supercharged attempt pump out, no go	
164	3077.00	3052.0	n/a	n/a	n/a	n/a	5336.26	10.2	n/a	n/a	119.00	n/a	5336.36	10cc DD tight	
165	3080.90	3055.9	n/a	n/a	n/a	n/a	5343.21	10.2	n/a	n/a	118.95	n/a	5343.14	5 cc DD Tight	
166	3089.00	3064.0	n/a	n/a	n/a	n/a	5357.30	10.2	n/a	n/a	119.07	n/a	5357.40	5cc DD + 10cc DD retract 5cc DD tight then lost seal	
167	3093.80	3068.8	n/a	n/a	n/a	n/a	5365.56	10.2	5169.00	9.88	119.50	n/a	5365.80	5cc DD + 5cc DD super charged	
168	3095.00	3070.0	n/a	n/a	n/a	n/a	5368.10	10.2	4803.07	9.18	119.84	n/a	5368.44	5cc DD pump to OFA take two 450 MRSM samples	20.5
169	3103.50	3078.5	n/a	n/a	n/a	n/a	5383.40	10.2	5352.00	10.20	120.50	n/a	5383.40	5cc DD + 5cc DD super charged leaking/supercharged	
170	3103.80	3078.8	n/a	n/a	n/a	n/a	5384.00	10.2	4808.70	9.17	120.29	n/a	5383.60	5cc DD Take 2 X 450cc MRSM chamber samples	292.9
171	3110.20	3085.2	n/a	n/a	n/a	n/a	5394.70	10.2	n/a	n/a	120.12	n/a	5394.88	5cc DD + 5cc DD super charged	
172	3110.50	3085.5	n/a	n/a	n/a	n/a	5395.75	10.2	n/a	n/a	121.00	n/a	5395.40	5cc DD tight	
173	3114.00	3089.0	n/a	n/a	n/a	n/a	5402.00	10.2	n/a	n/a	121.10	n/a	5402.02	5cc DD supercharged	
174	3115.10	3090.1	n/a	n/a	n/a	n/a	5404.00	10.2	n/a	n/a	122.00	n/a	5405.05	5cc DD leaking, pump to try to get seal, no go	
175	3116.80	3091.8	n/a	n/a	n/a	n/a	5407.10	10.2	n/a	n/a	121.61	n/a	5407.06	5cc DD leakimg + 10cc DD Leaking	
176	3121.00	3096.0	n/a	n/a	n/a	n/a	5414.44	10.2	n/a	n/a	121.50	n/a	5414.03	10cc DD leaking 10cc DD leaking	
177	3122.00	3097.0	n/a	n/a	n/a	n/a	5416.40	10.2	4860.79	9.21	121.80	n/a	5415.89	10cc DD pump to OFA take two 450cc MRSM samples	24.2
178	3125.50	3100.5	n/a	n/a	n/a	n/a	5422.10	10.2	n/a	n/a	122.50	n/a	5421.20	10cc DD tight	

Table 2.3

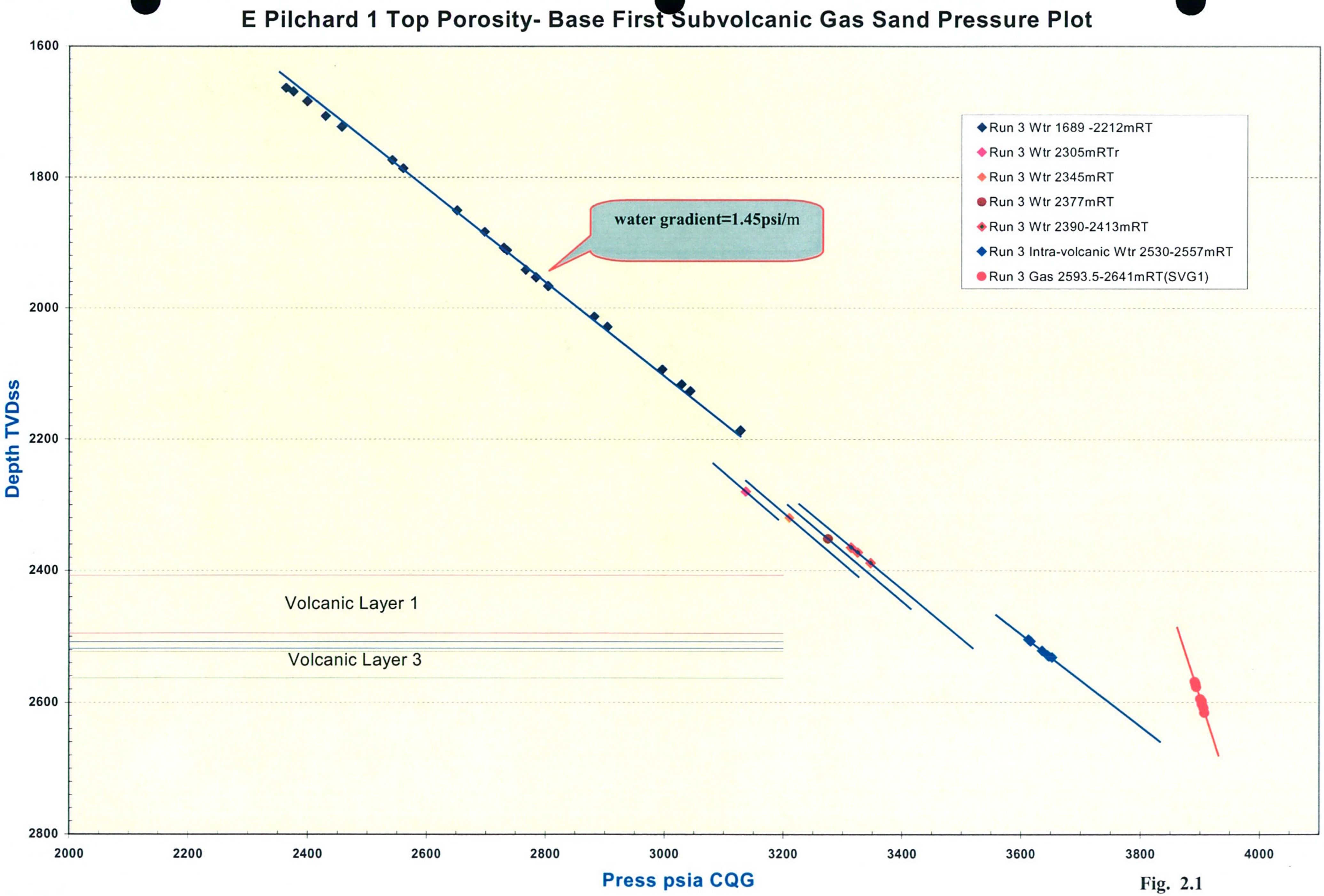

E Pilchard 1 Top Porosity- Base First Subvolcanic Gas Sand Pressure Plot
Run 3 Wtr 1689 -2212mRT
Run 3 Wtr 2305mRTr
Run 3 Wtr 2345mRT
Run 3 Wtr 2377mRT
Run 3 Wtr 2390-2413mRT
Run 3 Intra-volcanic Wtr 2530-2557mRT
Run 3 Gas 2593.5-2641mRT(SVG1)
water gradient=1.45psi/m
Volcanic Layer 1
Volcanic Layer 3
Depth TVDss
Press psia CQG
1600
1800
2000
2200
2400
2600
2800
2000
2200
2400
2600
2800
3000
3200
3400
3600
3800
4000

Fig. 2.1

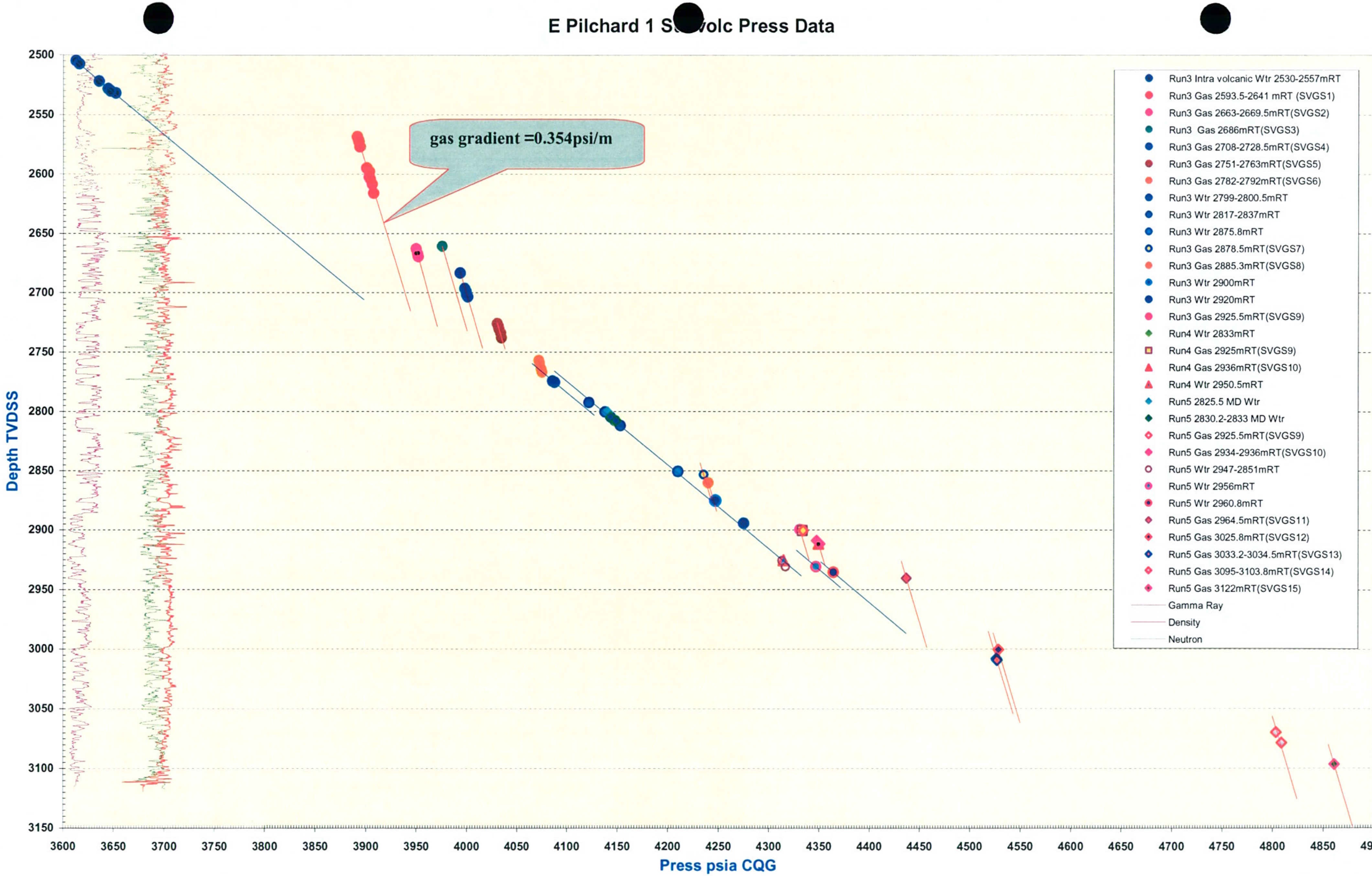

E Pilchard 1 S volc Press Data
gas gradient =0.354psi/m
Depth TVDSS
Press psia CQG
Run3 Intra volcanic Wtr 2530-2557mRT
Run3 Gas 2593.5-2641 mRT (SVGS1)
Run3 Gas 2663-2669.5mRT(SVGS2)
Run3 Gas 2686mRT(SVGS3)
Run3 Gas 2708-2728.5mRT(SVGS4)
Run3 Gas 2751-2763mRT(SVGS5)
Run3 Gas 2782-2792mRT(SVGS6)
Run3 Wtr 2799-2800.5mRT
Run3 Wtr 2817-2837mRT
Run3 Wtr 2875.8mRT
Run3 Gas 2878.5mRT(SVGS7)
Run3 Gas 2885.3mRT(SVGS8)
Run3 Wtr 2900mRT
Run3 Wtr 2920mRT
Run3 Gas 2925.5mRT(SVGS9)
Run4 Wtr 2833mRT
Run4 Gas 2925mRT(SVGS9)
Run4 Gas 2936mRT(SVGS10)
Run4 Wtr 2950.5mRT
Run5 2825.5 MD Wtr
Run5 2830.2-2833 MD Wtr
Run5 Gas 2925.5mRT(SVGS9)
Run5 Gas 2934-2936mRT(SVGS10)
Run5 Wtr 2947-2851mRT
Run5 Wtr 2956mRT
Run5 Wtr 2960.8mRT
Run5 Gas 2964.5mRT(SVGS11)
Run5 Gas 3025.8mRT(SVGS12)
Run5 Gas 3033.2-3034.5mRT(SVGS13)
Run5 Gas 3095-3103.8mRT(SVGS14)
Run5 Gas 3122mRT(SVGS15)
Gamma Ray
Density
Neutron

Fig. 2.2

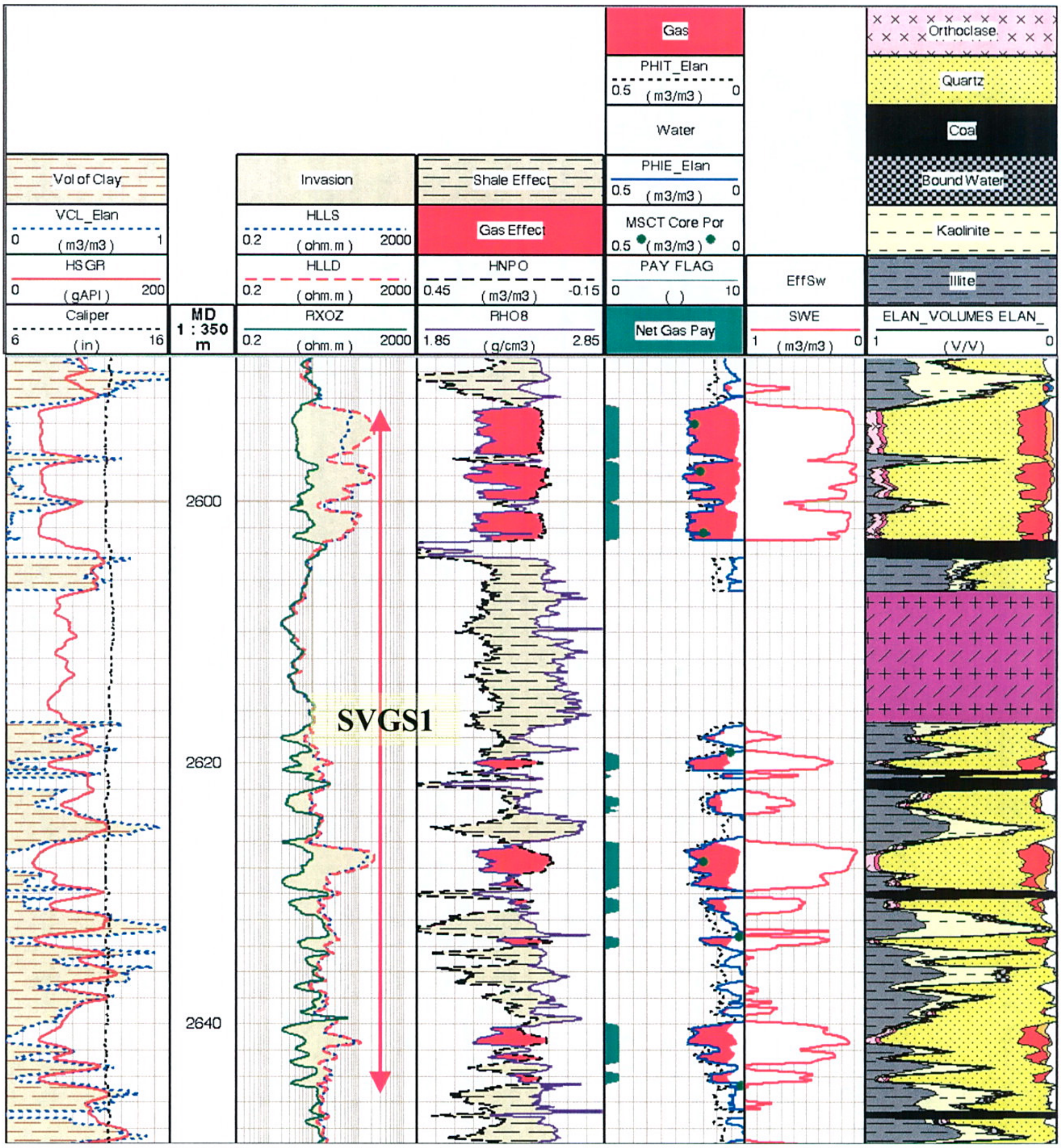


Fig. 2.3

The gas gradient of SVGS1 calculated from the pressure data is 0.354psi/m (0.108psi/ft). Subvolcanic gas system 2 or SVGS2 as shown in Fig.2.4 extends from 2661.2mRT(2636mSS) to 2670.5mRT(2645.5mSS). Its gas gradient is almost the same as SVGS1. SVGS3 is represented by a thin gas sand the extends from 2684.9 - 2686.6mRT (Fig.2.4).

PE908923 - color Φ16

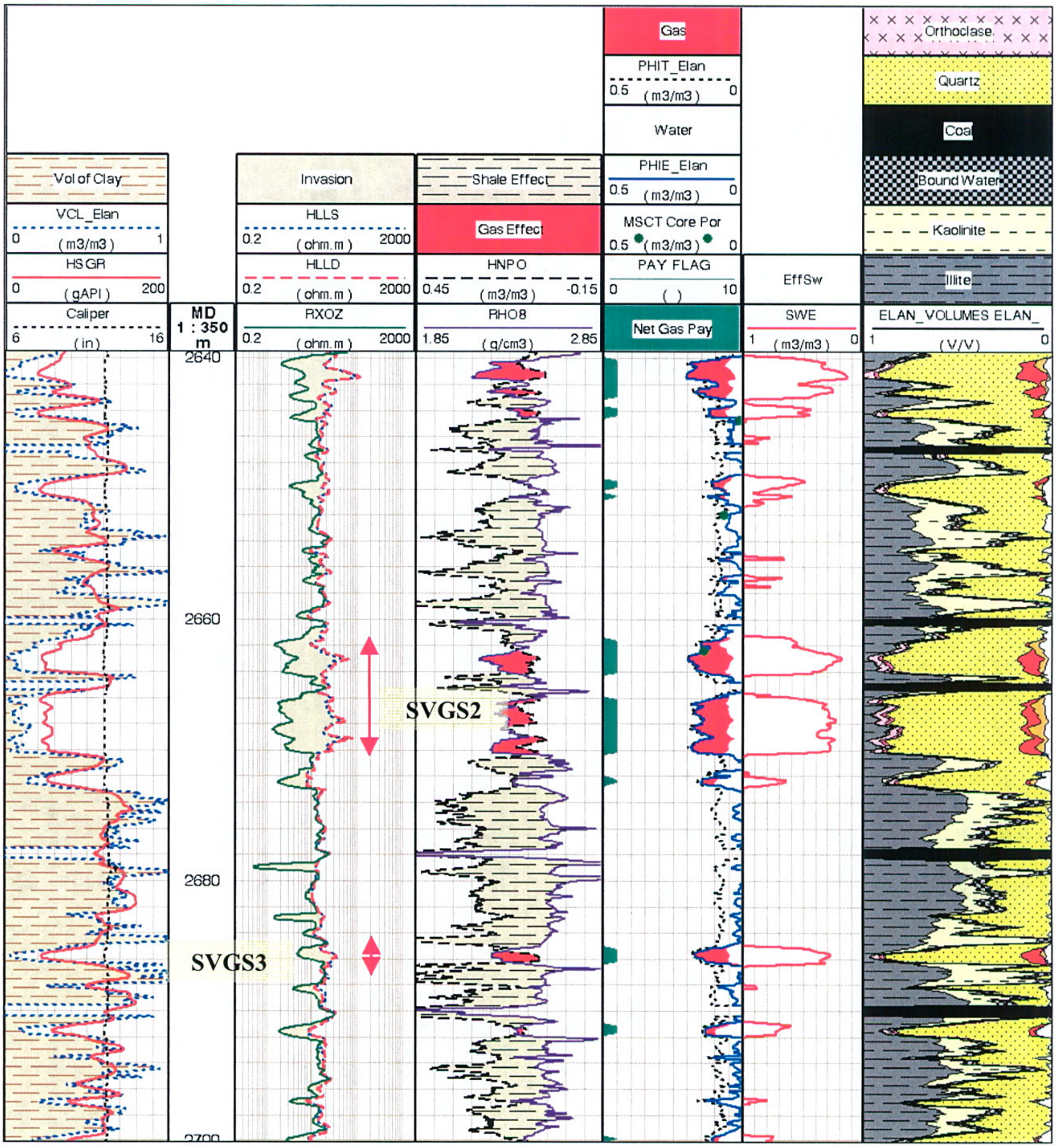


Fig. 2.4

The gas sands that belong to SVGS4 extend from 2708.9mRT to 2729.3mRT (Fig.2.5). The apparent gas gradient is very similar to that of SVGS1.
The gas sands in the intervals 2747.7 - 2765.1mRT and 2780.7 - 2793.0mRT (Fig.2.6) are clearly in separate systems and are designated as SVGS5 and SVGS6 respectively. The first water sand occurs 5m below the sand that belong to SVGS6 (Fig.2.6). The pressure data suggest that a gas-water contact for this sand lies close to the base of sand (+/-2794mRT).

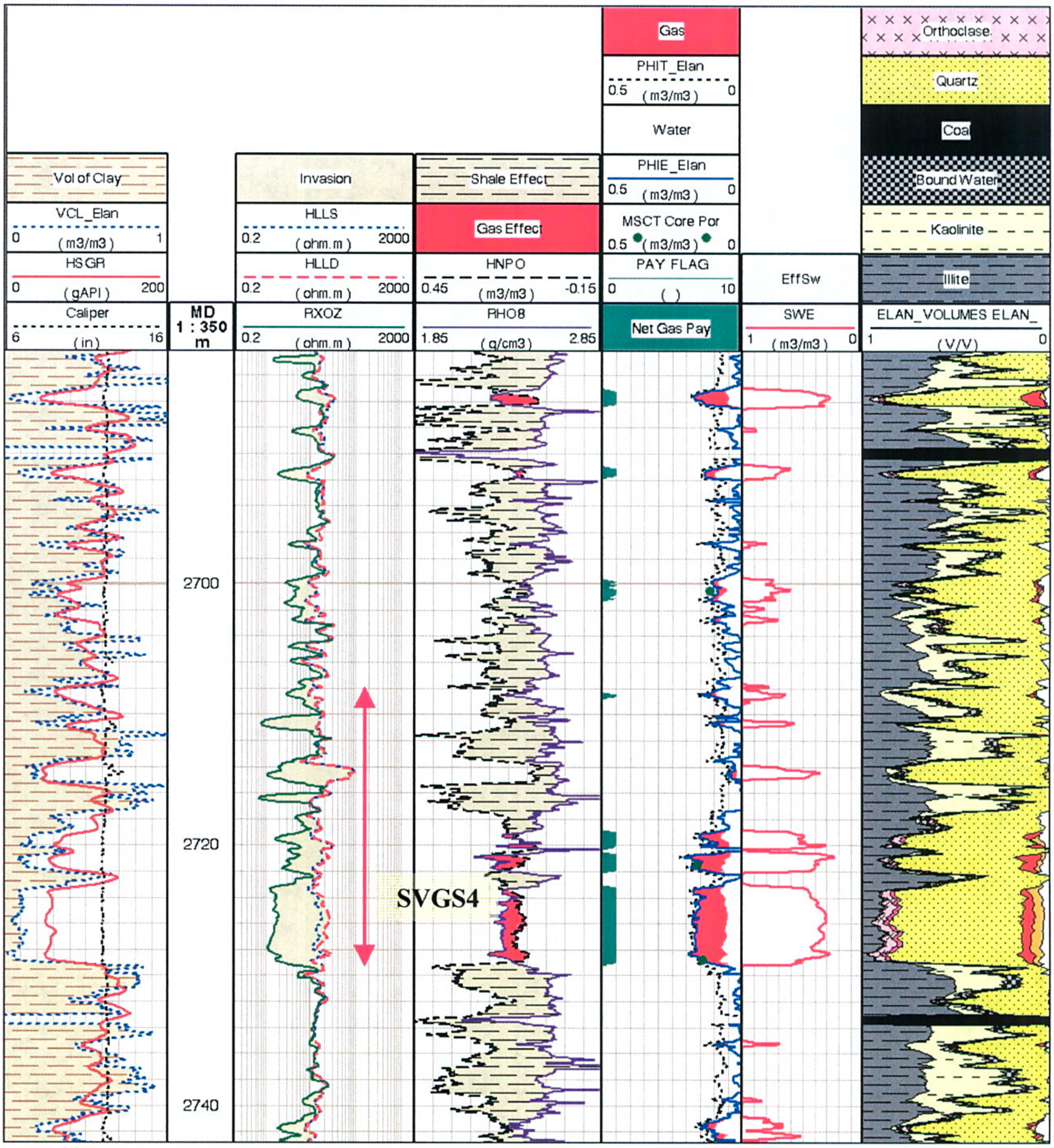


Fig. 2.5

Four gas bearing sands occur in the interval 2816.8mRT to 2953mRT (Fig. 2.7) which is predominantly water bearing. The pressure data indicates that the water bearing sands in this interval belong to one pressure system with the top seal being the shale at 2802 - 2816mRT and the base seal being a thin shale at 2953.5 - 2955.1mRT. The indication from the pressure data is that the two thin gas sands that extend from 2877.7mRT to 2879.1mRT ((SVGS7) and 2885.0mRT to 2885.6mRT (SVGS8) probably have small gas columns. It is also possible they could be in one pressure system given the similar pressure values.

PE908923_color Ø18

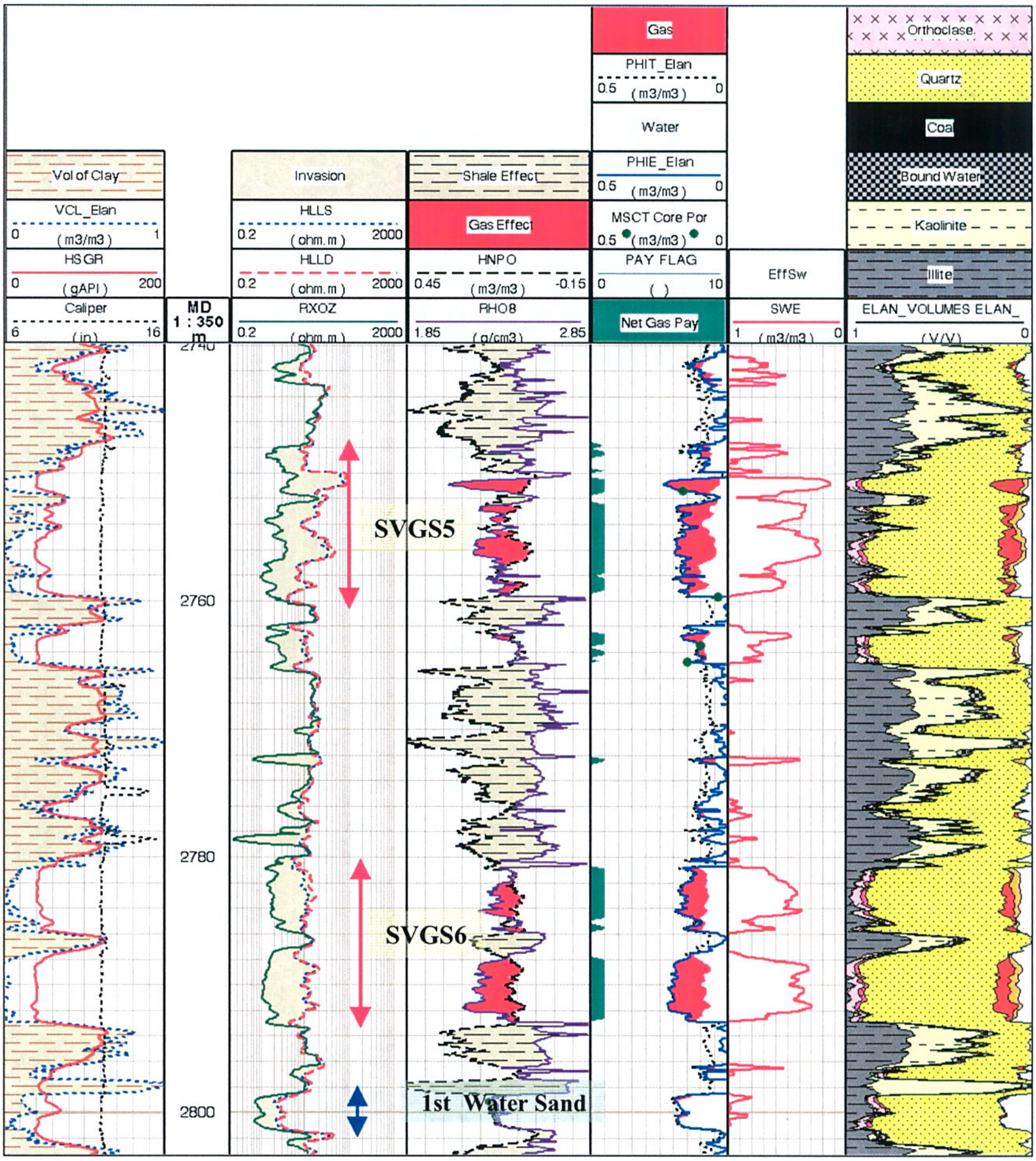


Fig. 2.6

PE908923_color 019

908923 050

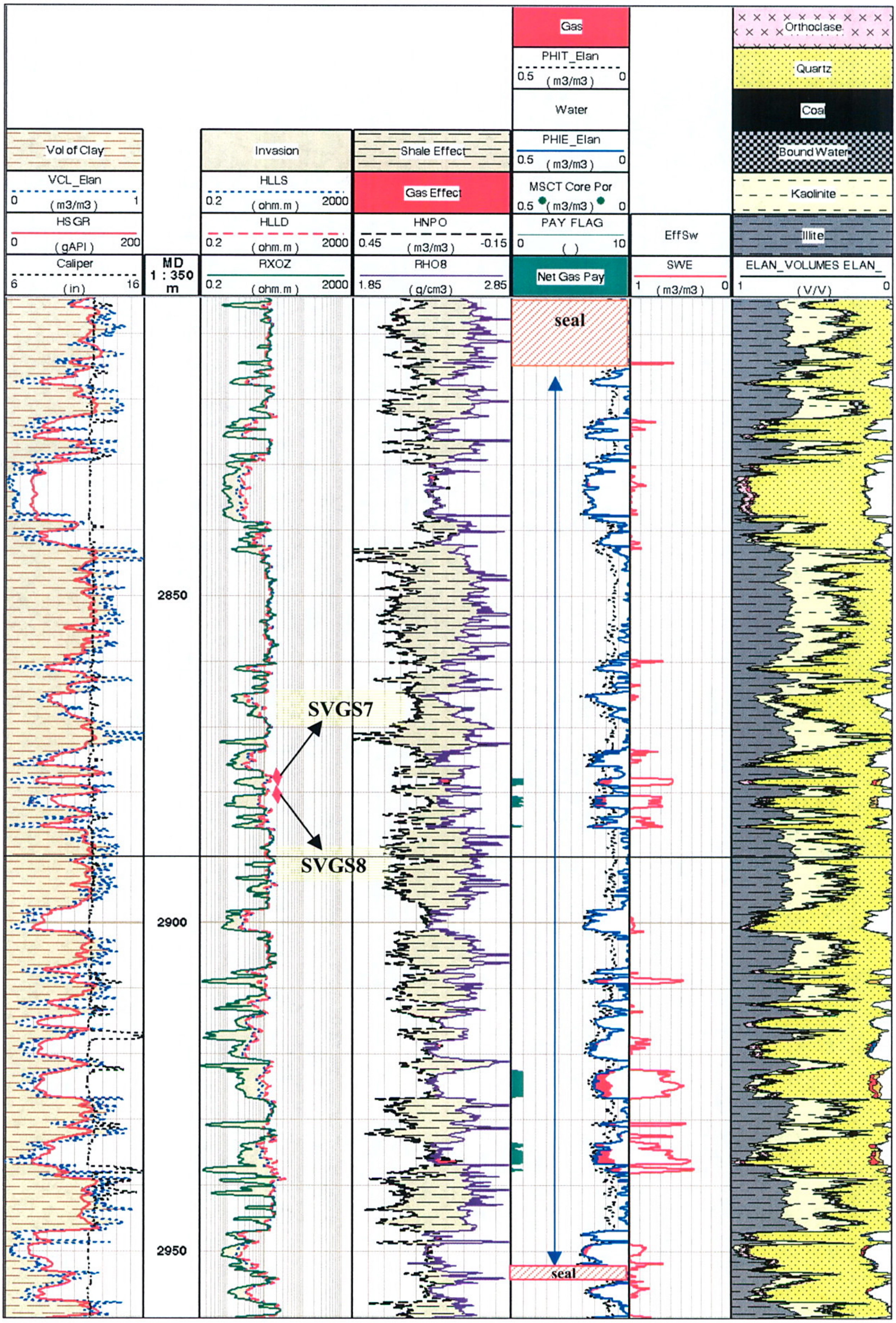


Fig. 2.7

The other two gas sands from 2922.4mRT to 2926.9mRT (SVGS9) and 2933.5mRT to 2937mRT (SVGS10) (Fig. 2.8) are clearly in separate systems. The only perplexing factor about these sands is determining as to which aquifer system underlies them. Log data would suggest that these sands are likely to be associated with the 2818.8-2953mRT aquifer system because of the water sand at 2947 - 2953mRT. The pressure data on the other hand suggests that they could be associated with the aquifers represented by the water sands, 2955.1mRT to 2957.4mRT and 2959.9mRT to 2961.8mRT. Below 2960mRT at least 5 gas systems have been identified and these are illustrated in Fig.2.8, Fig. 2.9, and Fig. 2.10. It is likely there are more systems but because of the poor quality of the reservoirs it was not possible to define them (tight MDT pressure tests).

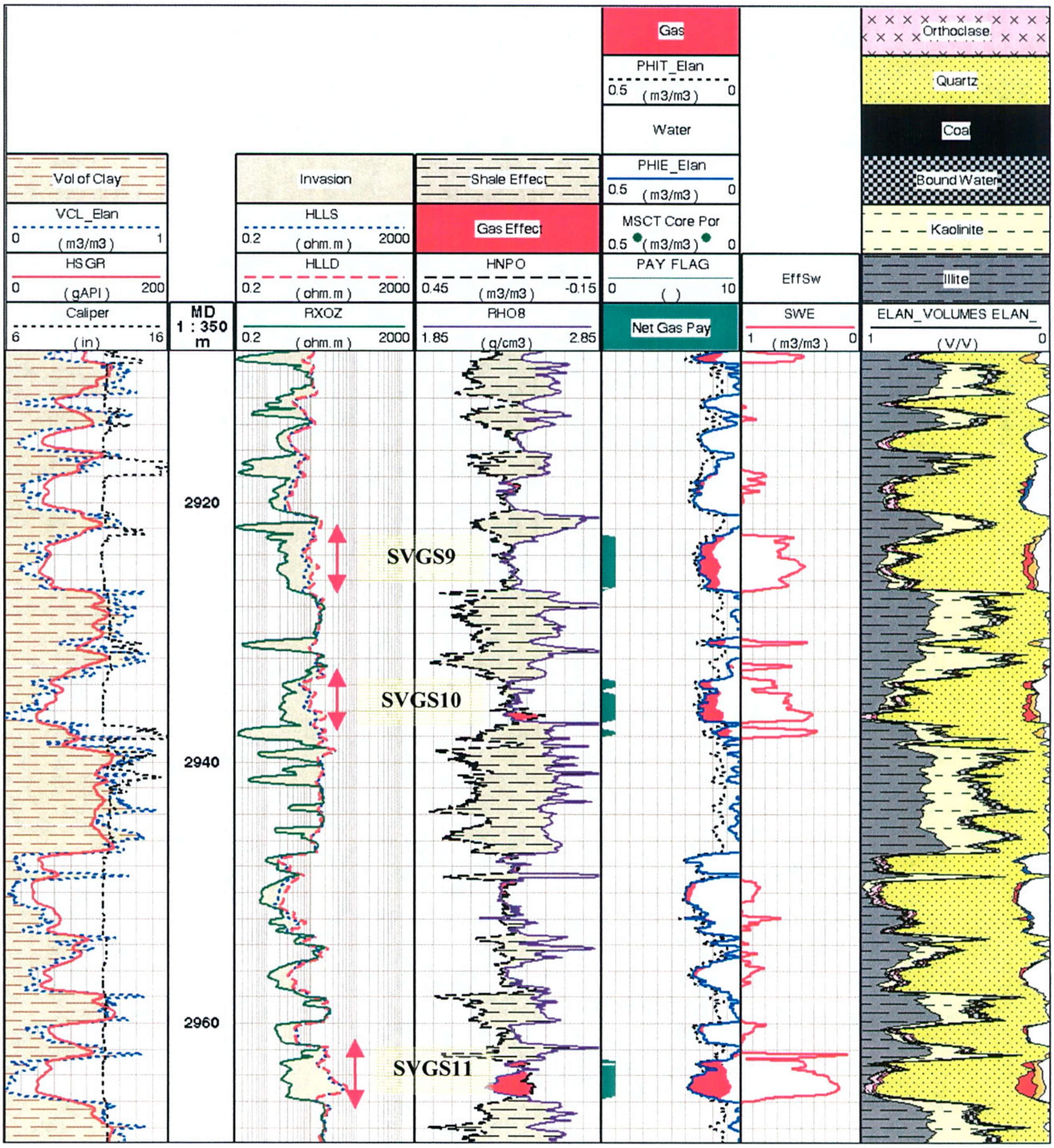


Fig. 2.8

PE908923_color 021

908923 052

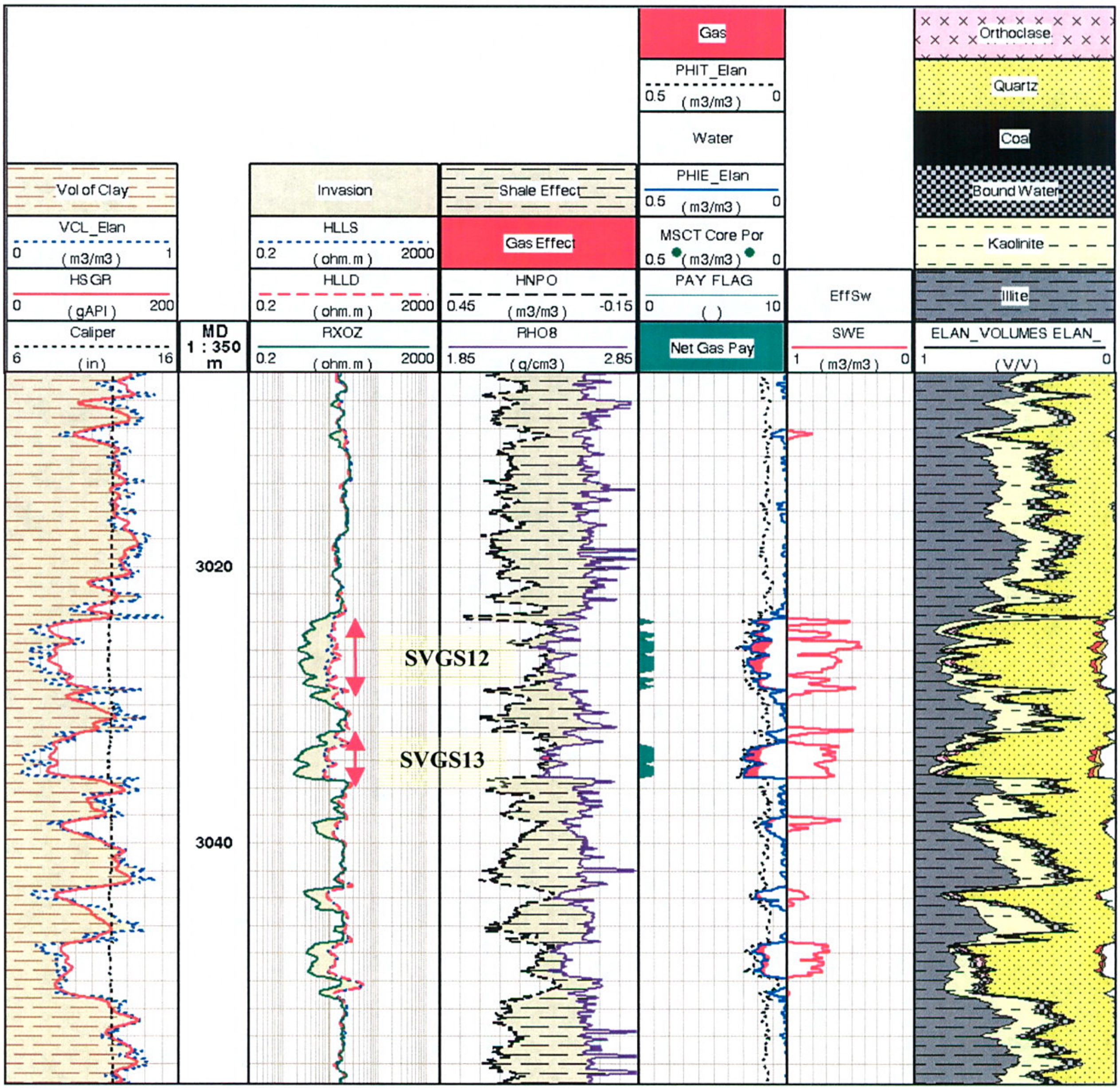


Fig. 2.9

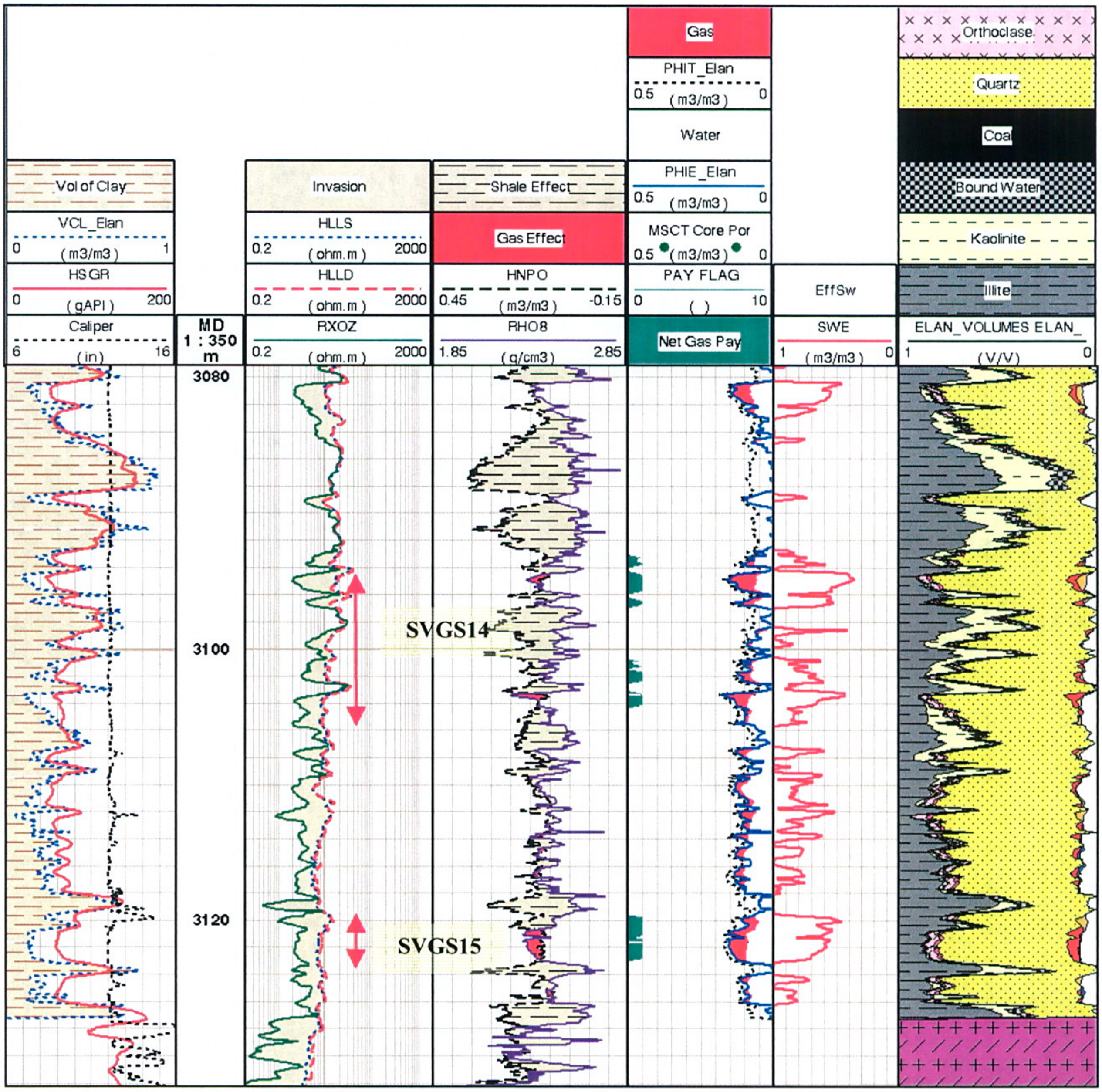

Gas
PHIT_Elan
0.5 (m3/m3) 0
Water
PHIE_Elan
0.5 (m3/m3) 0
MSCT Core Por
0.5 (m3/m3) 0
PAY FLAG
0 ( ) 10
Net Gas Pay
Orthoclase
Quartz
Coal
Bound Water
Kaolinite
Illite
ELAN_VOLUMES ELAN_
1 (V/V) 0
Vol of Clay
VCL_Elan
0 (m3/m3) 1
HSGR
0 (gAPI) 200
Caliper
6 (in) 16
MD
1 : 350
m
Invasion
HLLS
0.2 (ohm.m) 2000
HLLD
0.2 (ohm.m) 2000
RXOZ
0.2 (ohm.m) 2000
Shale Effect
Gas Effect
HNPO
0.45 (m3/m3) -0.15
RHOB
1.85 (g/cm3) 2.85
EffSw
SWE
1 (m3/m3) 0
3080
3100
3120
SVGS14
SVGS15

Fig. 2.10

3.0 Fluid Sampling and Composition

A total of 22 gas samples were attempted at 15 depth points (Table 3.1) with 20 successful recoveries. The samples were taken using a combination of 1-gallon chambers and two multi-sample modules (MRMS). 10 of the samples were analysed at the rigsite for gas composition by ACS Laboratories during the transfer of the gas samples from the MDT chambers to the ACS cylinders. The results are listed in Table 3.2. The samples were then shipped to Petrolab (PVT lab) where another gas composition analysis was carried out. The results are presented in Table 3.3. Both analyses indicate that the gas composition from all the sands is very similar. The carbon dioxide content varies from about 11% to 22% (laboratory analysis). The only unusual feature of the compositional analysis is the fact that the sample from 2925.5mRT showed a carbon dioxide content of 49% by rigsite analysis and only 21% by laboratory analysis. ACS indicated that they performed the analysis by two methods and both gave the same results. No credible explanation is offered for this discrepancy at this stage. Final gas composition of the gas samples is to be determined with PVT analysis, which will be carried out in the near future.

Sampling & Transfer Details				Sampling Conditions		Field Opening Conditions		
Sample Number	Sampling Depth (m RT)	Down Hole Tool Number	ACS Cylinder Number	Pressure (psia)	Temperature (°C)	Pressure (psia)	Temperature (°C)	Free Water Volume (cc's)
1	2925.5	MRSC-BB-090	817398	4329.0	112.4	3415	20	310
2	2593.5	MRSC-BB-119	817397	3891.6	88.4	3855	14	0
-	2593.5	MPSR-0157	N/A	3891.6	88.4	3990	14	N/A
-	2596.0	MPSR-0193	N/A	3892.2	94.2	4015	14	N/A
3	2627.5	MPSR-0501	817395	3907.1	95.5	3965	14	5
-	2627.5	MPSR-0123	N/A	3907.1	95.5		Tool Empty	
5	2667.5	MPSR-0503	817393	3950.8	101.9	3315	13	50
6	2728.5	MPSR-0487	TS-39-18	3999.9	104.5	2615	13	Water Sample
7	2728.5	MRSC-BB-105	817394	3999.9	104.5	3415	13	N/A
8	2756.0	MPSR-0478	TS-33-09	4031.7	105.3	3315	13	0
9	2792.0	MPSR-0477	817396	4074.6	107.2	3415	13	15
-	2627.5	MPSR-0122	N/A	3902.6	95.5	3215	13	N/A
-	2641.0	MPSR-0156	N/A	3906.8	99.9	3265	13	N/A
-	2792.0	MPSR-0187	N/A	4069.9	107.2	3425	13	N/A
-	2965.5	MPSR-0123	TS-24711	4436.5	114.3	2265	13	0
-	2965.5	MPSR-0477	TS-24713	4436.5	114.3	3015	13	0
-	3095.0	MPSR-0186	TS-23-05	4803.1	120.8	2925	13	80
-	3095.0	MPSR-0497	N/A	4803.1	120.8		Tool Empty	
-	3103.8	MPSR-0192	TS-24409	4808.4	120.3	2965	13	0
-	3103.8	MPSR-0479	TS-23804	4804.4	120.3	3015	13	0
-	3122.0	MPSR-0494	TS-27-07	4860.8	121.8	2865	13	0
-	3122.0	MPSR-0485	TS-24410	4860.8	121.8	2815	13	0

Table 3.1

Gas Compositon in Mol %										
Sampling Depth mRT	2593.5	2627.5	2667.5	2728.5	2792.0	2925.5	2965.5	3095.0	3103.8	3122.0
Hydrogen Sulphide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carbon Dioxide	9.49	12.57	16.00	15.82	16.40	49.60	15.17	14.79	15.77	13.50
Nitrogen	2.35	2.29	2.10	2.31	2.20	0.49	2.84	3.02	2.59	2.57
Methane	76.82	74.98	71.91	72.24	72.21	45.72	71.97	73.95	73.10	75.06
Ethane	6.01	5.55	5.52	5.48	5.20	2.29	5.26	4.92	4.99	5.20
Propane	3.03	2.65	2.65	2.53	2.37	1.11	2.74	2.02	2.14	2.23
iso-Butane	0.52	0.45	0.41	0.38	0.38	0.19	0.65	0.31	0.32	0.33
n-Butane	0.89	0.73	0.68	0.64	0.60	0.26	0.74	0.51	0.56	0.58
iso-Pentane	0.30	0.25	0.23	0.20	0.20	0.10	0.27	0.16	0.18	0.18
n-Pentane	0.31	0.26	0.24	0.21	0.20	0.10	0.19	0.16	0.18	0.18
Hexanes	0.14	0.12	0.11	0.09	0.10	0.06	0.08	0.07	0.08	0.08
Heptanes	0.10	0.10	0.09	0.06	0.08	0.05	0.06	0.06	0.06	0.06
Octanes plus	0.04	0.05	0.06	0.04	0.06	0.03	0.03	0.03	0.03	0.03
Total	100	100	100	100	100	100	100	100	100	100

Table 3.2 ACS Analysis

Gas Composition in Mol%																				
Depth mRT	2593.50	2593.50	2596.00	2627.50	2627.50	2641.00	2667.50	2728.50	2756.00	2756.00	2792.00	2792.00	2925.50	2965.50	2965.50	3095.00	3103.80	3103.80	3122.00	3122.00
Hydrogen Sulphide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carbon Dioxide	13.06	11.18	13.27	17.45	14.74	16.17	20.41	17.94	17.60	22.02	22.11	19.12	21.47	16.50	19.10	16.22	19.79	16.71	16.82	14.29
Nitrogen	0.20	0.19	0.21	0.17	0.17	0.15	0.16	0.20	0.15	0.13	0.13	0.18	0.14	0.14	0.15	0.13	0.22	0.15	0.17	0.17
Methane	71.67	73.62	71.34	70.03	71.82	71.90	66.65	69.84	71.20	65.71	66.08	69.60	65.87	70.94	68.92	72.57	69.55	72.07	72.90	74.13
Ethane	6.34	6.47	6.34	5.43	5.84	5.49	5.54	5.58	5.65	5.45	5.23	5.39	5.52	5.35	5.22	5.16	4.94	5.18	5.11	5.22
Propane	3.18	3.11	3.02	2.12	2.76	2.11	2.30	2.39	2.34	2.32	1.94	2.14	2.30	2.76	2.64	2.00	1.87	1.93	2.01	2.02
Iso-Butane	0.61	0.45	0.47	0.38	0.45	0.45	0.32	0.42	0.42	0.41	0.38	0.39	0.49	0.76	0.68	0.28	0.30	0.34	0.32	0.36
N-Butane	1.02	0.99	0.97	0.86	0.78	0.77	0.64	0.66	0.74	0.71	0.62	0.63	0.79	0.80	0.77	0.55	0.59	0.68	0.63	0.68
Iso-Pentane	0.35	0.34	0.34	0.29	0.26	0.24	0.21	0.21	0.24	0.23	0.20	0.20	0.28	0.33	0.32	0.18	0.19	0.21	0.19	0.21
N-Pentane	0.37	0.35	0.36	0.30	0.26	0.23	0.21	0.22	0.25	0.24	0.21	0.20	0.26	0.23	0.22	0.19	0.20	0.22	0.20	0.23
Hexanes	0.55	0.55	0.92	0.48	0.43	0.37	0.36	0.37	0.36	0.38	0.36	0.32	0.40	0.40	0.37	0.33	0.30	0.33	0.28	0.36
Heptanes	0.94	0.97	1.03	0.94	0.84	0.73	0.98	0.78	0.57	0.77	0.82	0.64	0.81	0.72	0.64	0.78	0.66	0.75	0.54	0.79
Octanes	0.53	0.55	0.70	0.58	0.52	0.47	0.64	0.49	0.29	0.53	0.60	0.41	0.50	0.35	0.30	0.62	0.47	0.53	0.34	0.55
Nonanes	0.46	0.46	0.37	0.49	0.44	0.35	0.68	0.38	0.14	0.43	0.48	0.32	0.45	0.25	0.22	0.50	0.38	0.42	0.27	0.44
Decanes	0.22	0.23	0.20	0.23	0.21	0.15	0.27	0.20	0.04	0.22	0.24	0.12	0.23	0.13	0.16	0.20	0.16	0.17	0.11	0.21
Undecanes	0.11	0.12	0.11	0.11	0.11	0.08	0.14	0.10	0.01	0.10	0.14	0.06	0.12	0.07	0.08	0.07	0.07	0.09	0.03	0.09
C12+	0.39	0.42	0.35	0.14	0.37	0.34	0.49	0.22	0.00	0.35	0.46	0.28	0.37	0.27	0.21	0.22	0.31	0.22	0.08	0.25
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table 3.3 Petrolab Analysis

APPENDIX 2

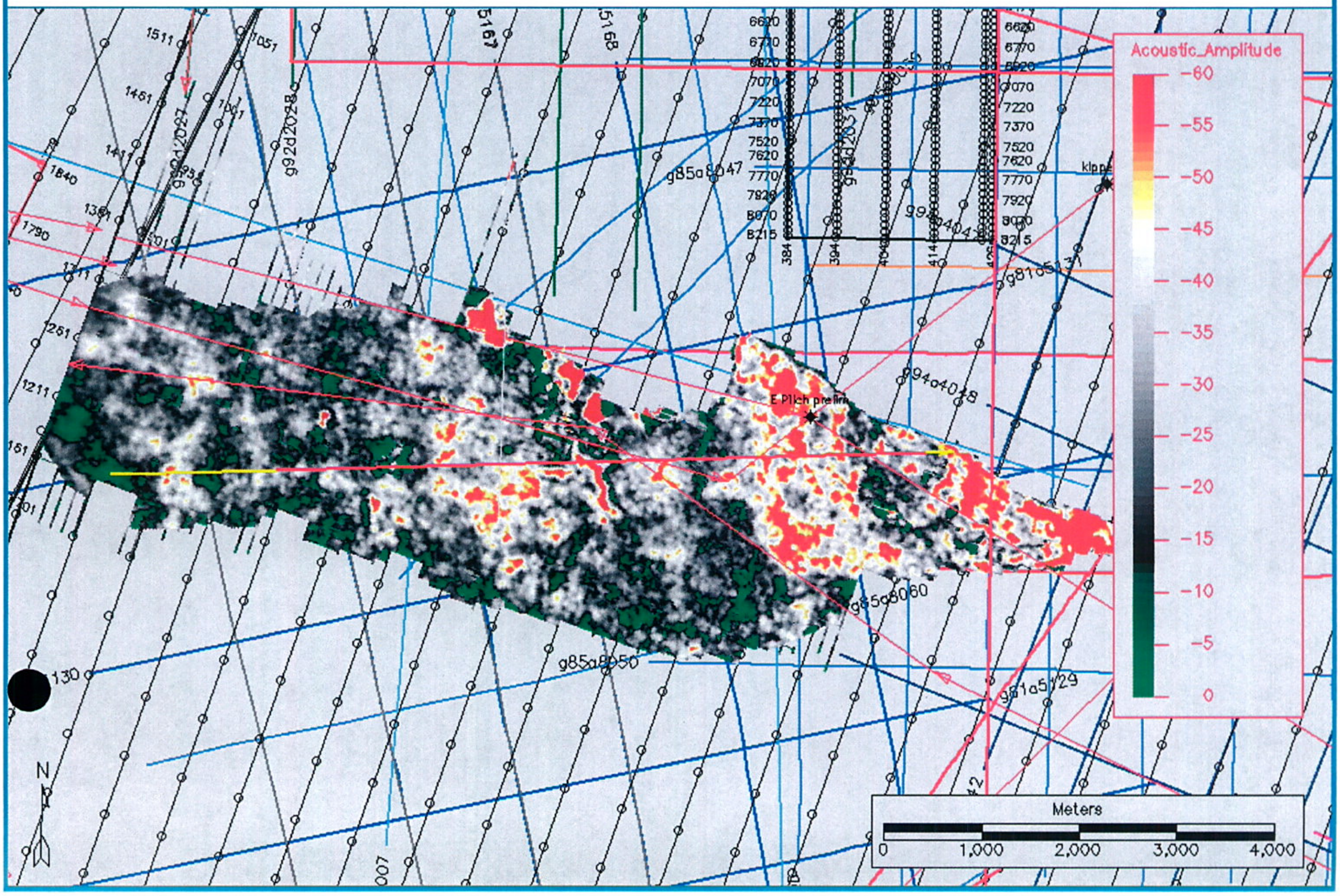
QUANTITATIVE FORMATION EVALUATION

EAST PILCHARD 1

QUANTITATIVE PETROPHYSICAL INTERPRETATION

KUMAR KUTTAN

December 2001



SUMMARY

East Pilchard 1 was drilled as an exploration well in VIC/L9 licence area of the Gippsland Basin. It was drilled to test the hydrocarbon potential of the fluvial reservoirs of the sub-volcanic Golden Beach Group in a fault dependent closure in the Pilchard fault block. The well found water bearing reservoirs between the top of porosity at 1687mRT and 2558mRT and several gas bearing sands in the interval 2592 - 3126.5mRT. The gas-bearing interval could be broadly divided into 3 main zones.
The reservoirs in the upper zone from 2592mRT to 2793mRT are all gas bearing and are probably the best of the three zones from a reservoir quality standpoint. The average effective porosity of the sandstones in this zone ranges from 12 to 16% and with permeabilities up to 2900md. The average effective water saturation ranges from 22% to 75%. The pressure data indicates that there are at least 6 separate fluid systems in this zone. However, there are no observable fluid contacts within the sandstone intervals.
The middle zone, which extends from 2798mRT to 2966mRT, is predominantly water bearing with three gas bearing intervals. The gas bearing sandstones reservoirs are generally thin with average effective porosities ranging from 12% to 15% and high effective water saturations (37% to 73%). The pressure data indicates that the gas sands are in separate fluid systems.
The bottom zone extends from 3023mRT to 3126.5mRT and all the sandstones reservoirs in this zone are interpreted to be gas bearing. The reservoir quality of these reservoirs is the poorest of the three zones as indicated by numerous tight MDT pressure tests. Average effective porosity and water saturation ranges from 9% to 13% and 51% to 88% respectively. Pressure data indicate that the gas sands appear to be in separate fluid systems.

An effective porosity cut-off of 8% was used to determine net porous intervals in the interval 2592 mRT to 3126.5 mRT. Net gas pay was then determined using a combination of volume of clay and MDT pressure testing results. The total net gas pay in East Pilchard 1 is estimated to be **100.7m**. The contribution to this net pay from the three zones is as follows:

Interval (m)	Net Pay (m)	% of Total Pay
2592 - 2793	68.9	68
2798 - 2966	13.9	14
3023 - 3126.5	17.9	18

TABLE OF CONTENTS

1.0 Introduction

1.1 General

East Pilchard 1 was drilled as an exploration well in VIC/L9 licence area of the Gippsland Basin (Fig 1.1). It was drilled to evaluate the hydrocarbon potential of the fluvial reservoirs of the sub-volcanic Golden Beach Group in a fault dependent closure in the Pilchard fault block. The well was spudded on the 3trd of July 2001, drilled to a total depth of 3138 mRT (Driller) 3140.6 mRT (Logger) and cased and suspended as a future gas producer. 2000. The primary objective of this quantitative petrophysical interpretation was to evaluate the reservoirs for porosity, water saturation and net pay.

Note: All depths quoted in this report are logged mRT unless otherwise specified

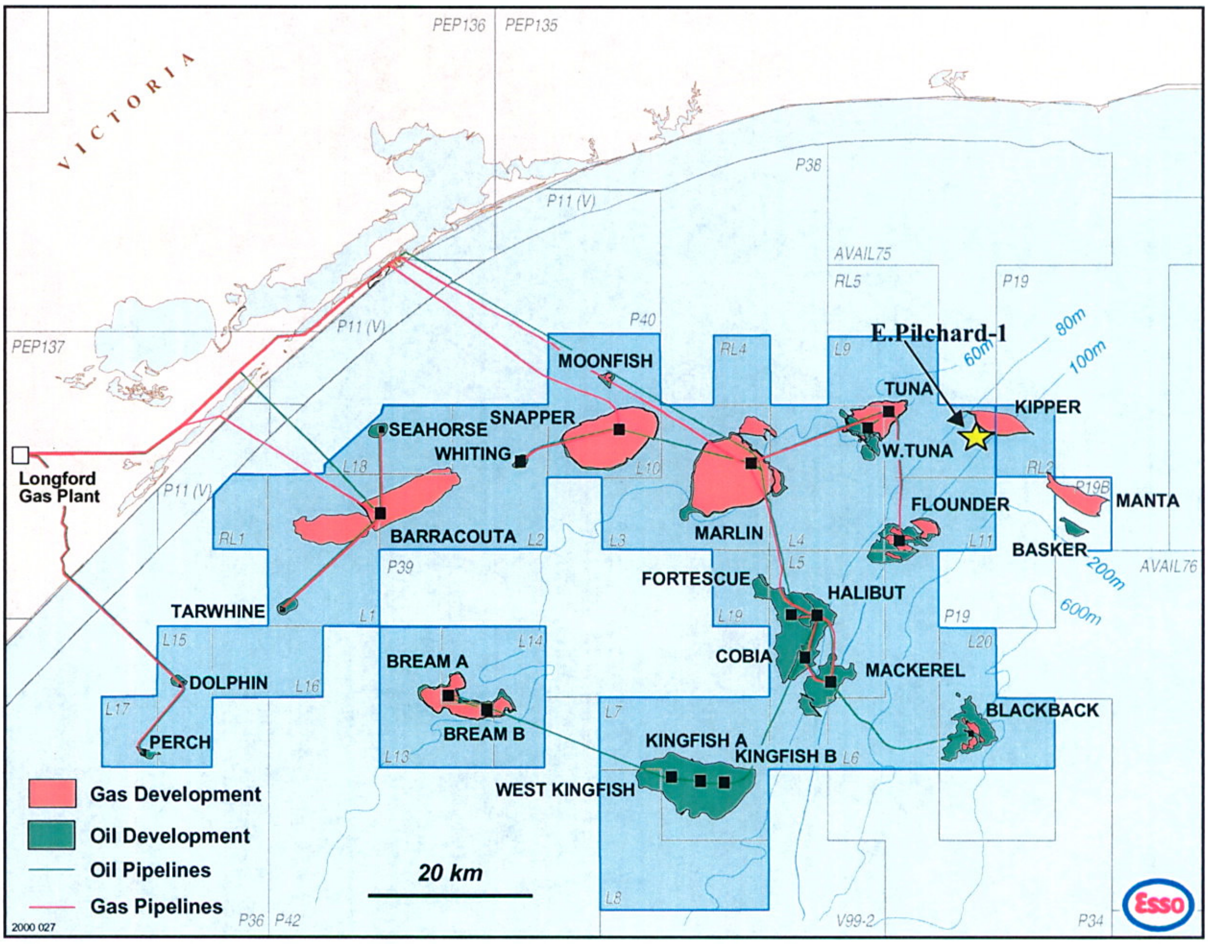


Fig 1.1 East Pilchard 1 Location Map

2.0 Data

2.2 Wireline Logs

The open hole logs run in the well are listed in Table 2.1.

Survey /Log	Company	Top (m RT)	Bottom (m RT)
Suite 1 Run at 2947.5m			
MWD Survey	Anadrill Schlumberger	146.11	2459.4
Multishot Survey	SDI	2488.3	2771.0
PEX-HALS-DSI-HNGS-LEHQT	Schlumberger	873.5	2945.2
MDT-GR-LEHQT	Schlumberger	1689.03	2926.5
FMI-HRLA-GR-LEHQT	Schlumberger	2220	2947.5
MDT-GR-LEHQT	Schlumberger	2593	2641
MDT-GR-LEHQT	Schlumberger	2641	2885.4
MSCT-GR_LEHQT	Schlumberger	2450	2878.5
Suite 2 Run at 3140m			
TLD-HGNS-HNGS	Schlumberger	3139	2870
HALS-HGNS-DSI-LEHQT	Schlumberger	3139	2870
MDT-GR-LEHQT	Schlumberger	2825.5	2956.2
DUAL CSAT-VSP	Schlumberger	3140	146
MDT-GR-LEHQT	Schlumberger	2825.5	3125.5
CST-GR	Schlumberger	3134	1650

Table 2.1 Summary of Wireline Logs

2.2.1 Logging Suite 1

The PEX density-neutron and GR logs were acquired in very high-resolution mode from 2947.5m to 1564m at 900ft/hr. Above this depth all logs were acquired in standard resolution mode. The DSI was run in P & S and Upper Dipole modes. The HRLA was run with the FMI in order to evaluate the tool for possible use in future exploration wells. While logging up with the PEX-HALS-DSI-HNGS from 2947.5m there were several buffer overloads and as a result the interval had to be logged in several sections. Two MDT runs were made, the first run was for pressures while the second was for fluid samples. A total of 25 MSCT samples were attempted with 20 successful recoveries.

2.2.2 Logging Suite 2

In order that density-neutron data could be obtained for the very bottom part of the hole the PEX-HALS-HNGS-DSI string was split and run separately. As was done in the first logging suite, the PEX-density-neutron and GR logs were obtained in very high-resolution mode and the DSI was run in P& S and Upper Dipole mode. Several technical problems were encountered with MDT run as part of this suite of logs. Details of the logging operations of both these suites are to be found in Appendix 3.

2.3 Log Quality

The overall data quality of the resistivity, density-neutron logs and the MDT pressure data is good. Except for ECGR there is general agreement between PEX GR (HGR, GR) and the HNGS derived GR (HSGR) below 1560m. Above this depth there is a significant difference between HSGR and HGR. This difference is due to the fact that the logging speed was increased from 1800 ft/hr to 3600 ft/hr above 1560m (HNGS data was not required above this depth per Esso's logging program). As for the DSI data, visual examination of the wellsite STC processed logs namely DT2R indicated that the dipole data was of acceptable quality. Subsequent Geoquest computer centre processing indicated that the dipole data was unusable (the error bars of the computed DT shear curve were well outside acceptable limits). Investigation of the problem by Schlumberger indicated that that the poor quality of the dipole data was due to the misorientation of the receivers in the DSI sonde. Hence, no usable shear data were derived from the dipole data. The only shear wave data available for this well comes from the monopole data and it is sporadic. The MSCT core depths had to be adjusted and this was done on the basis of the petrographic data and comparison of log derived porosity with measured MSCT core porosity data.

2.4 MSCT Core Analysis and Petrology

ACS Laboratories Pty. Ltd carried out the core analysis on 16 of the 20 MSCT cores. The measurements included porosity, permeability at ambient and overburden conditions and grain density. The results of the analysis are provided in Appendix 2. Petrographic and XRD analysis of small samples taken from the 16 MSCT cores were also carried out and results are presented in a separate report.

2.5. Data Processing

The PEX-HALS-HNGS-HRLA data from the two logging suites were spliced with Geoframe Petrophysics Welledit module. Because the suite 1 logs were obtained at two different logging speeds (900ft below 1560m and 3600ft/hr above) and were presented as separate runs there were all together two splices for each of the logs. The two splice points were at 1553m and 2902m. PRE-PLUS (Schlumberger's environmental corrections module in Geoframe Petrophysics) was run on one of the suites of logs before the logs were spliced. Comparison of the processed and the field logs indicated that there was only negligible difference between the two sets of data and therefore it was decided not to run PRE-PLUS on the remaining suite. All the resistivity logs (HLLD, HLLS, RXOZ, RXOI etc) were depth aligned to the high-resolution density log (RHO8).
The high-resolution density log (RHO8) was edited for washouts and in zones which were interpreted to be carbonaceous (values in these zones were set to values of adjacent true shales). Curves identifying coals (FLAG.COAL) and volcanics (FLAG.VOLC were also created. A temperature log was also created using the bottom hole and surface temperature data obtained from the PEX-HALS suites. This was used as one of the inputs for the quantitative interpretation.

3.0 Quantitative Interpretation

3.1 Methodology

Total porosity (PHIT), Effective Porosity (PHIE or PIGE), mineral volumes and fluid volumes were derived using Schlumberger's least square inversion program, ELAN+. The ELAN+ mineral model was constructed from the results of XRD analysis carried out on the 16 MSCT samples. The bulk rock XRD analysis as shown in Table 3.1 indicated that the mineral composition of the reservoirs consists predominantly of quartz, clays (illite/micas and kaolinite), k-feldspars and plagioclase. Some samples contain siderite and ankerite. The petrographic analysis indicates that most of the clay appears to be dispersed.

Sample #	Depth (mRT)	Qtz	KF	PF	I/M	Ka	Sid	Ank
3	2594.0	91	3	2	2	2	-	-
4	2598.0	93	4	1	1	1	-	-
5	2602.0	90	4	1	1	4	-	-
7	2620.0	41	2	3	26	16	12	-
8	2627.5	90	1	2	2	4	1	-
9	2633.5	60	3	2	15	20	-	-
11	2644.0	56	5	2	10	10	17	-
12	2652.0	84	2	-	5	8	1	-
13	2663.0	87	2	1	4	5	-	1
15	2700.5	80	3	1	8	8	-	-
17	2721.5	91	2	-	4	3	-	-
18	2728.5	92	3	1	-	3	-	1
19	2751.0	91	4	-	1	4	-	-
21	2759.0	56	2	1	15	26	-	-
22	2763.0	88	3	1	-	4	-	4
23	2764.5	92	2	1	1	2	-	2

Qtz = quartz KF = K-feldspar PF = plagioclase I/M = illite/mica Ka = kaolinite Sid = siderite Ank = ankerite

Table 3.1 Bulk Rock XRD Analyses

The ELAN+ model and input parameters are described in Appendix 1

3.2 Fluid Saturations

ELAN+ uses the Dual Water saturation model for determining water saturations both in the invaded and uninvaded zones. However it does not output parameters such as *SWT* and *SWE* at the end of the processing. These have to be recomputed from the ELAN+ bulk fluid volume outputs per the equations shown below (equations 1 and 2)

$$SWT = \frac{VXBW + VUWA}{PHIT} \qquad (1)$$

$$SWE = \frac{VUWA}{VUWA + VUGA} \qquad (2)$$

where *VXBW* = Bulk Volume Clay Bound Water in the Invaded Zone, *VUWA*= Bulk Volume Free Water in the Uninvaded Zone ,*VUGA* = Bulk Volume Gas in the Uninvaded Zone, *PHIT* = Total Porosity

3.3 Results/Observations

The sandstone reservoirs in the interval 1687m - 2580m are all water bearing (Enclosure 1). The hydrocarbons are to be found in the sandstone reservoirs in the interval that extends from 2592m to 3126.5m. (Enclosure 2). All the hydrocarbons is gas and MDT recoveries indicate this gas to be extremely dry with a carbon dioxide content that ranges from 11% to 22%. This interval could be broadly divided into 3 main zones.

The reservoirs in the upper zone from 2592m to 2793m are all gas bearing. The sandsontes show considerable variation in reservoir quality as indicated by the MSCT permeabilities (Table in Appendix 2). However, in general the reservoirs are probably the best of all the 3 zones, in terms of thickness, porosity and gas saturation. The average effective porosity of the sandstones range from 12 to 16% and with permeabilities up to 2900md as indicated by the MSCT core analysis data. The average effective water saturation ranges from 22% to 75%. The MDT pressure data indicates that there are at least 6 separate fluid systems in this zone. However, there are no observable fluid contacts within the sandstone intervals.

The middle zone, which extends from 2798m to 2966m is predominantly water bearing with three gas bearing intervals. The gas sandstone reservoirs are generally thin with average effective porosities ranging from 12% to 15% and high effective water saturations (37% to 73%). The MDT pressure data indicates that the gas sands in this zone are in separate fluid systems.

The bottom zone extends from 3023m to 3126.5m. All the sandstone reservoirs are interpreted to be gas bearing. The reservoir quality of these reservoirs is the poorest of the three zones as indicated by numerous tight MDT pressure tests. Average effective porosity and water saturation ranges from 9% to 13% and 51% to 88% respectively. As observed in the other two zones, MDT pressure data indicate that the gas sands appear to be in separate fluid systems.

4.0 Net Pay

4.1 General

In the interval 1687m - 2520m (top of porosity to base of uppermost volcanic layer) net porous intervals were determined using a effective porosity cut-off of 12%. All the sandstone reservoirs in this interval are water bearing and hence no pay is reported. The results of the netting are presented in Table 7.1.

An effective porosity cut-off of 8% was used to determine net porous intervals in the interval 2520m to 3126.5m. Net gas pay was then determined using a combination of volume of clay and MDT pressure testing results. The results of the net porous/net pay intervals are presented in Table 7.2

7.3 Results and Observations

The total net gas pay in East Pilchard 1 is estimated to be **100.7m**. The contribution to this net pay from the three zones is as follows:

Interval (m)	Net Pay (m)	% of Total Pay
2592 - 2793	68.9	68
2798 - 2966	13.9	14
3023 - 3126.5	17.9	18

EAST PILCHARD 1

PETROPHYSICS ANALYSIS SUMMARY 1680 - 2520m MD

Net porosity cut-off: 0.120 volume per volume
Depth reference: MDKB

Net Porous Interval based on Porosity cut-off only.

GROSS INTERVAL metres top	base	Gross Metres	Net Metres	Net to Gross(%)	Mean VCL	(Std.) (Dev.)	Mean PHIE	(Std.) (Dev.)	Mode PHIE	Mean SWE	Remarks
1687.8	1696.8	8.9	7.2	80	0.10	0.11	0.230	0.030	0.250	1.00	Water Bearing
1699.6	1701.3	1.8	1.8	100	0.32	0.14	0.210	0.041	0.180	0.99	Water Bearing
1702.3	1710.3	8.0	7.4	92	0.10	0.13	0.230	0.050	0.280	1.00	Water Bearing
1714.1	1715.1	1.0	0.7	70	0.30	0.06	0.170	0.026	0.190	1.00	Water Bearing
1716.9	1717.8	0.9	0.8	84	0.20	0.14	0.250	0.053	0.300	1.00	Water Bearing
1725.4	1728.0	2.6	1.1	41	0.42	0.12	0.170	0.034	0.130	1.00	Water Bearing
1728.8	1745.7	16.8	12.8	76	0.19	0.13	0.210	0.045	0.240	1.00	Water Bearing
1747.6	1764.1	16.5	4.6	28	0.28	0.16	0.190	0.044	0.130	1.00	Water Bearing
1766.6	1780.8	14.2	7.5	53	0.28	0.10	0.220	0.038	0.180	0.99	Water Bearing
1785.8	1787.2	1.3	0.8	56	0.30	0.06	0.200	0.028	0.220	1.00	Water Bearing
1792.9	1821.7	28.7	24.3	85	0.15	0.13	0.240	0.047	0.270	1.00	Water Bearing
1822.8	1837.7	14.8	8.7	59	0.18	0.18	0.200	0.050	0.250	1.00	Water Bearing
1838.3	1860.1	21.8	17.9	82	0.20	0.15	0.220	0.048	0.260	1.00	Water Bearing
1860.4	1867.6	7.2	3.5	50	0.36	0.11	0.170	0.030	0.180	1.00	Water Bearing
1868.3	1879.2	10.9	10.6	97	0.09	0.10	0.230	0.047	0.290	1.00	Water Bearing
1880.1	1905.1	25.0	18.9	76	0.21	0.12	0.200	0.040	0.180	1.00	Water Bearing
1906.8	1919.5	12.8	9.9	78	0.13	0.16	0.210	0.035	0.220	1.00	Water Bearing
1923.3	1946.7	23.3	19.1	82	0.15	0.16	0.230	0.051	0.280	1.00	Water Bearing
1948.4	1953.7	5.2	2.4	46	0.24	0.10	0.190	0.037	0.220	0.98	Water Bearing
1963.0	1979.6	16.6	13.6	82	0.14	0.12	0.240	0.048	0.280	1.00	Water Bearing
1987.8	1992.9	5.1	4.5	87	0.13	0.10	0.210	0.039	0.240	1.00	Water Bearing
1997.9	2001.1	3.1	2.2	73	0.20	0.05	0.220	0.040	0.190	0.98	Water Bearing
2006.7	2011.7	5.0	3.0	60	0.21	0.09	0.220	0.044	0.250	1.00	Water Bearing
2015.3	2035.8	20.5	2.3	11	0.26	0.14	0.170	0.036	0.170	1.00	Water Bearing
2036.4	2102.8	66.3	61.0	92	0.13	0.11	0.210	0.029	0.230	1.00	Water Bearing
2115.1	2129.9	14.8	12.6	85	0.18	0.09	0.210	0.031	0.220	1.00	Water Bearing
2136.1	2153.9	17.8	12.4	70	0.16	0.11	0.210	0.032	0.220	1.00	Water Bearing
2185.7	2195.6	9.9	5.7	57	0.19	0.11	0.200	0.045	0.250	0.99	Water Bearing
2206.6	2255.1	48.5	20.6	42	0.30	0.10	0.170	0.030	0.150	1.00	Water Bearing
2257.1	2295.6	38.5	20.9	54	0.30	0.09	0.170	0.032	0.150	1.00	Water Bearing
2296.5	2306.4	9.9	8.3	84	0.22	0.07	0.190	0.034	0.190	1.00	Water Bearing
2316.7	2332.1	15.4	10.1	65	0.23	0.07	0.190	0.031	0.210	1.00	Water Bearing
2338.8	2360.1	21.3	9.9	46	0.11	0.09	0.210	0.039	0.240	1.00	Water Bearing
2371.1	2432.1	60.9	31.8	52	0.14	0.11	0.190	0.039	0.230	1.00	Water Bearing

Table 4.1 Petrophysical Summary 1687 - 2520

EAST PILCHARD 1

PETROPHYSICS ANALYSIS SUMMARY 2520 - 3143 m MD

Net porosity cut-off: 0.080 volume per volume
Depth reference: MDKB

Net Porous Interval based on Porosity cut-off only.

GROSS INTERVAL metres top	base	NET POROUS INTERVAL Gross Metres	Net Metres	Net to Gross(%)	Mean VCL	(Std.) (Dev.)	Mean PHIE	(Std.) (Dev.)	Mode PHIE	Mean SWE	Remarks	Net Pay
2521.10	2522.40	1.3	1.1	81	0.27	0.10	0.120	0.018	0.110	0.95	Water Bearing	
2528.40	2533.30	4.9	4.6	93	0.12	0.12	0.170	0.034	0.200	0.99	Water Bearing	
2542.70	2549.10	6.4	4.2	66	0.17	0.12	0.140	0.034	0.180	1.00	Water Bearing	
2551.40	2557.80	6.3	5.2	82	0.11	0.10	0.160	0.026	0.170	1.00	Water Bearing	
2592.20	2603.10	10.9	10.2	94	0.08	0.11	0.170	0.036	0.200	0.22	Gas Bearing	Y
2617.60	2618.40	0.8	0.8	100	0.31	0.06	0.110	0.021	0.090	0.84	Gas Bearing, tight	N
2619.10	2621.30	2.2	1.4	60	0.22	0.16	0.160	0.043	0.200	0.43	Gas Bearing	Y
2622.10	2623.90	1.8	1.6	89	0.27	0.05	0.120	0.013	0.130	0.72	Gas Bearing, low productivity	Y
2625.90	2629.80	3.9	3.8	95	0.11	0.10	0.160	0.029	0.170	0.29	Gas Bearing	Y
2630.30	2631.80	1.5	1.2	80	0.23	0.17	0.120	0.020	0.130	0.61	Gas Bearing	Y
2633.20	2634.40	1.1	0.7	61	0.11	0.09	0.130	0.024	0.140	0.45	Gas Bearing	Y
2639.70	2644.80	5.1	3.8	75	0.15	0.12	0.140	0.036	0.120	0.37	Gas Bearing	Y
2648.90	2651.40	2.6	1.0	39	0.17	0.08	0.100	0.009	0.100	0.62	Gas Bearing	Y
2661.20	2670.50	9.2	7.1	76	0.11	0.08	0.150	0.025	0.170	0.35	Gas Bearing	Y
2672.00	2673.10	1.1	0.7	67	0.17	0.04	0.130	0.022	0.150	0.74	Gas Bearing, low productivity	Y
2684.90	2686.60	1.8	1.2	69	0.18	0.13	0.140	0.025	0.170	0.36	Gas Bearing	Y
2690.90	2692.10	1.2	0.9	74	0.18	0.08	0.120	0.014	0.130	0.69	Gas Bearing, low productivity	Y
2699.60	2701.50	1.9	1.8	92	0.28	0.07	0.100	0.010	0.090	0.76	Gas Bearing, low productivity	Y
2708.10	2708.90	0.9	0.7	72	0.23	0.05	0.110	0.016	0.100	0.78	Gas Bearing, thin sand, low productivity	Y
2718.90	2729.30	10.4	8.9	85	0.14	0.08	0.150	0.024	0.160	0.40	Gas Bearing	Y
2740.90	2743.40	2.5	1.5	59	0.32	0.10	0.110	0.018	0.100	0.73	Prob. Gas bearing, tight	N
2747.60	2759.80	12.1	10.1	83	0.13	0.13	0.150	0.034	0.160	0.49	Gas Bearing	Y
2761.90	2765.10	3.2	2.9	90	0.11	0.08	0.120	0.022	0.110	0.74	Gas Bearing, low productivity	Y
2772.10	2773.00	0.9	0.3	39	0.24	0.02	0.100	0.011	0.100	0.46	Gas Bearing	Y
2775.40	2777.20	1.9	1.1	57	0.22	0.08	0.100	0.010	0.100	0.90	Gas Bearing, tight	N
2780.70	2793.00	12.3	10.6	86	0.06	0.06	0.160	0.034	0.200	0.54	Gas Bearing	Y
2798.50	2801.50	3.0	2.7	90	0.11	0.05	0.170	0.021	0.180	0.95	Water Bearing	
2816.80	2818.10	1.3	1.1	85	0.16	0.09	0.140	0.021	0.160	1.00	Water Bearing	
2822.90	2842.60	19.7	14.4	73	0.13	0.10	0.150	0.032	0.180	0.98	Water Bearing	
2859.70	2861.60	1.9	1.0	53	0.24	0.13	0.120	0.021	0.140	0.94	Water Bearing	
2864.80	2868.90	4.1	2.2	53	0.33	0.06	0.120	0.028	0.140	0.98	Water Bearing	
2873.10	2876.10	3.0	2.2	74	0.25	0.10	0.130	0.022	0.140	0.94	Water Bearing	
2877.70	2879.10	1.4	1.1	76	0.12	0.10	0.120	0.016	0.130	0.63	Gas Bearing	Y
2880.40	2882.60	2.2	1.8	80	0.2	0.05	0.130	0.013	0.140	0.73	Gas Bearing, low productivity	Y
2885.00	2885.60	0.6	0.5	77	0.1	0.05	0.140	0.023	0.170	0.76	Gas Bearing, thin sand, low productivity	Y
2897.80	2901.50	3.7	3.5	93	0.16	0.07	0.160	0.027	0.170	0.98	Water Bearing	
2906.90	2908.10	1.2	0.7	54	0.2	0.06	0.120	0.015	0.130	0.98	Water Bearing	
2911.80	2921.10	9.3	6.5	69	0.22	0.12	0.130	0.026	0.140	0.97	Water Bearing	
2922.40	2926.90	4.5	4.2	94	0.21	0.08	0.130	0.018	0.140	0.62	Gas Bearing	Y
2933.50	2937.00	3.5	3.3	94	0.18	0.09	0.130	0.019	0.130	0.63	Gas Bearing	Y
2947.00	2953.30	6.3	5.8	91	0.14	0.09	0.160	0.030	0.150	0.94	Water Bearing	
2955.10	2957.40	2.3	2.1	89	0.2	0.05	0.140	0.026	0.160	0.93	Water Bearing	
2959.90	2961.80	1.9	1.6	79	0.25	0.07	0.130	0.015	0.130	0.93	Water Bearing	
2962.80	2966.20	3.4	3.0	88	0.09	0.07	0.150	0.031	0.170	0.37	Gas Bearing	Y
3023.80	3029.40	5.6	3.9	68	0.25	0.09	0.110	0.016	0.120	0.66	Gas Bearing, low productivity	Y
3032.60	3035.50	2.9	2.3	81	0.18	0.06	0.120	0.019	0.140	0.69	Gas Bearing, low productivity	Y
3043.20	3044.20	0.9	0.6	58	0.18	0.02	0.100	0.005	0.100	0.87	Gas Bearing, tight	N
3047.20	3049.90	2.7	1.8	65	0.28	0.05	0.090	0.010	0.080	0.75	Gas Bearing, tight	N
3073.60	3075.20	1.7	1.2	71	0.1	0.04	0.120	0.017	0.130	0.51	Gas Bearing	Y
3076.40	3077.70	1.2	0.9	68	0.13	0.07	0.120	0.015	0.130	0.52	Gas Bearing	Y
3080.30	3083.10	2.8	1.9	69	0.2	0.05	0.120	0.020	0.140	0.59	Gas Bearing, tight	N
3088.50	3089.30	0.8	0.5	56	0.16	0.03	0.090	0.006	0.090	0.88	Gas Bearing, tight	N
3092.80	3097.10	4.4	2.3	52	0.18	0.06	0.120	0.022	0.120	0.52	Gas Bearing, thin sand, low productivity	Y
3100.80	3105.60	4.8	3.9	80	0.23	0.06	0.110	0.021	0.100	0.72	Gas Bearing, thin sand, low productivity	Y
3107.60	3118.10	10.5	8.4	80	0.2	0.05	0.110	0.016	0.130	0.81	Gas Bearing, tight	N
3119.60	3123.20	3.7	3.4	92	0.2	0.08	0.130	0.023	0.150	0.63	Gas Bearing	Y
3124.10	3126.40	2.3	2.0	85	0.19	0.05	0.100	0.008	0.090	0.86	Gas Bearing, tight	N

Net Pay Flag: Y=Yes N=No

NET GAS PAY = 100.7 m

Table 4.2 Petrophysical Summary 2520 -3126.5m

APPENDIX 1

ELAN+ Analysis Model & Parameters

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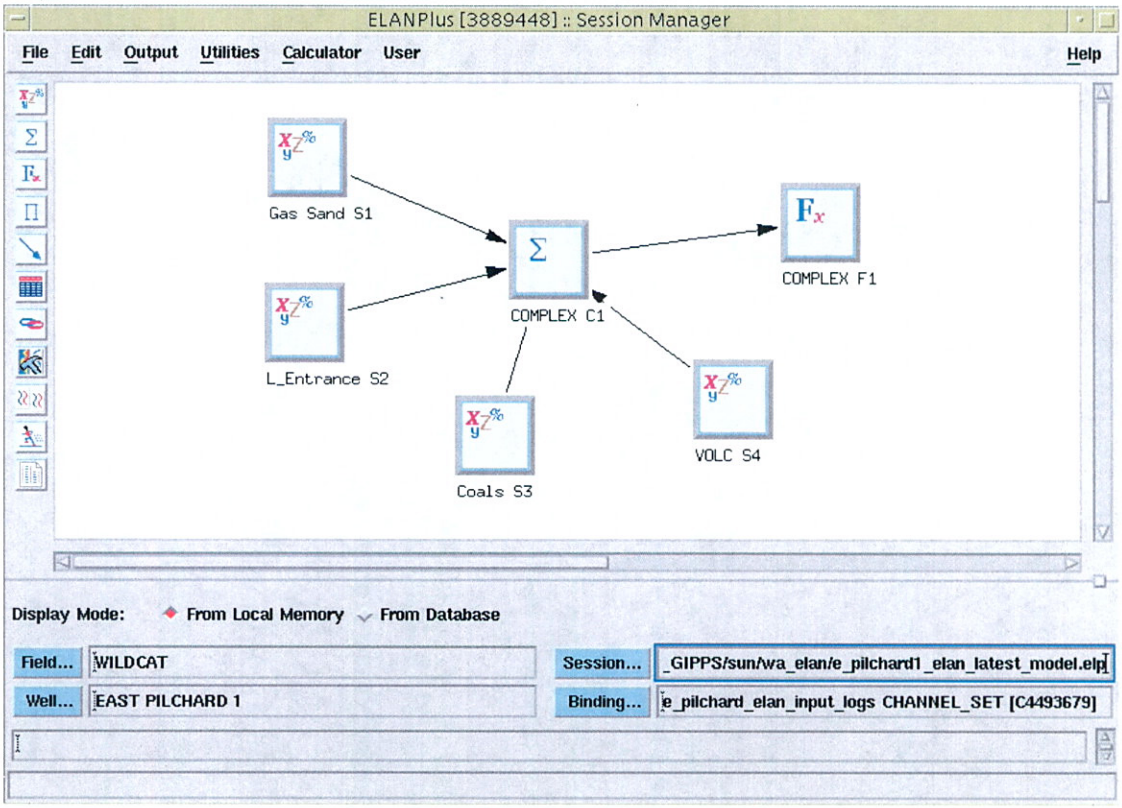
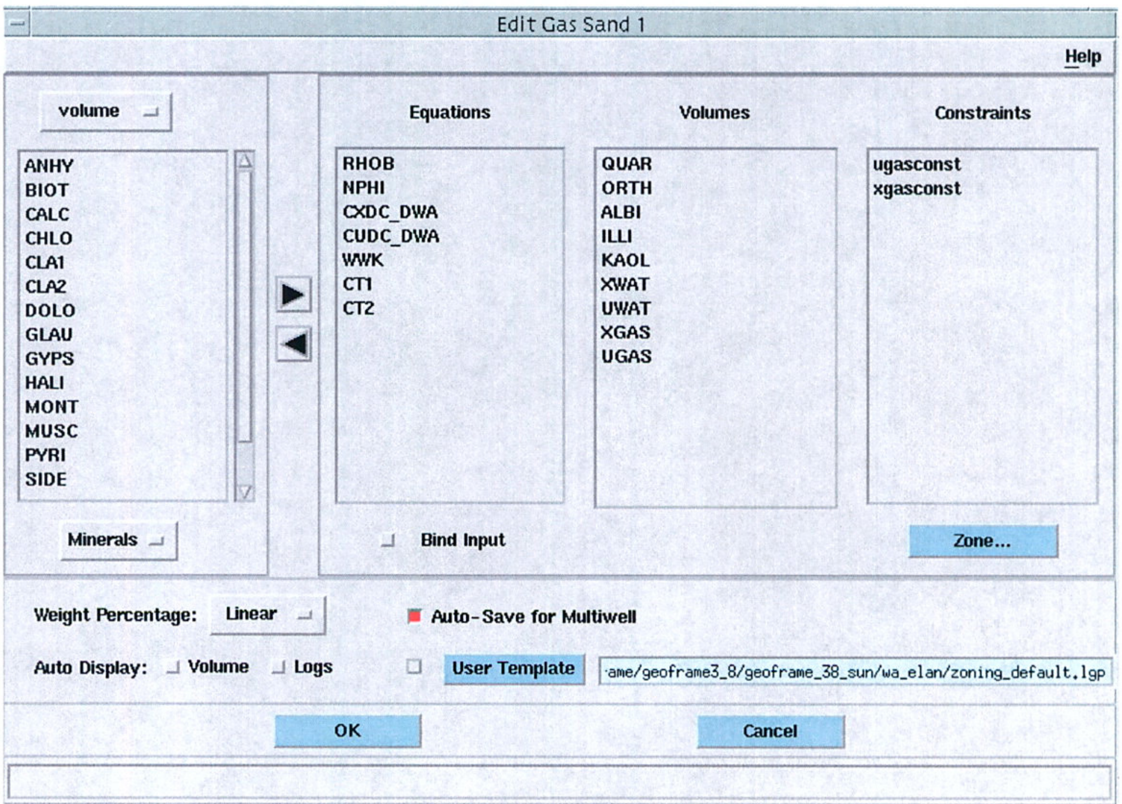


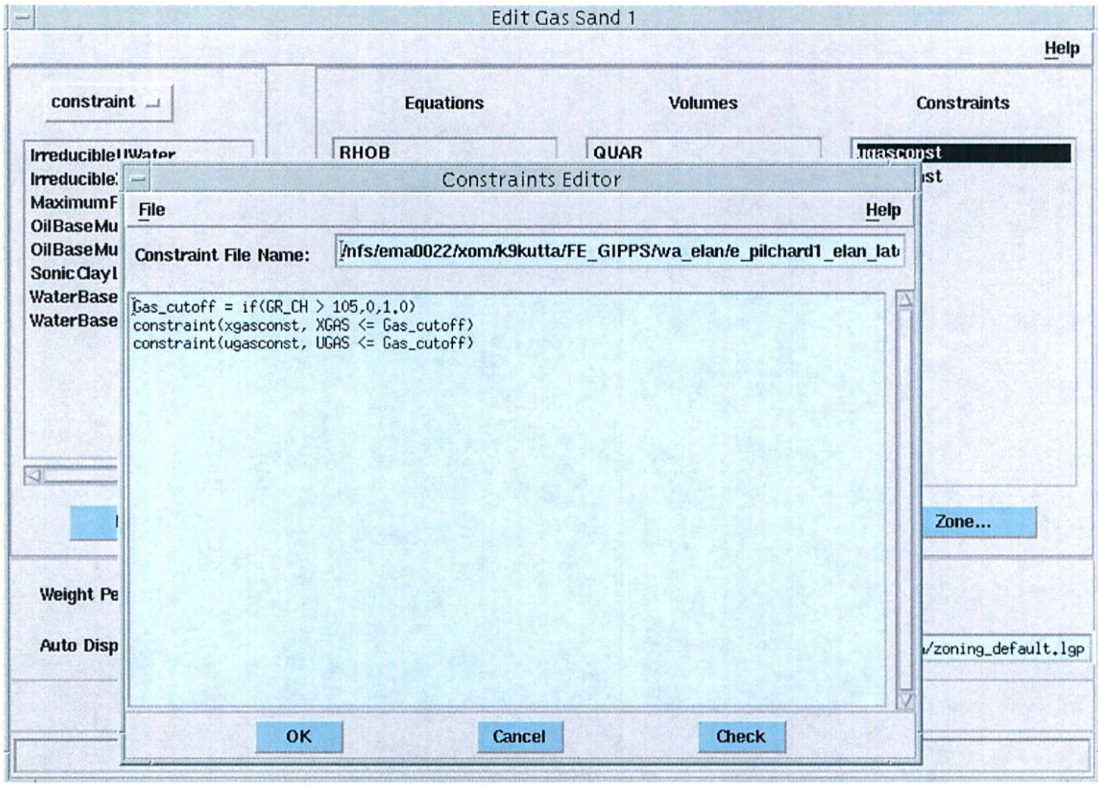
East Pilchard 1 Elan + Model



East Pilchard 1 Gas Sand Solve Process

908923 069

PE908923_color026



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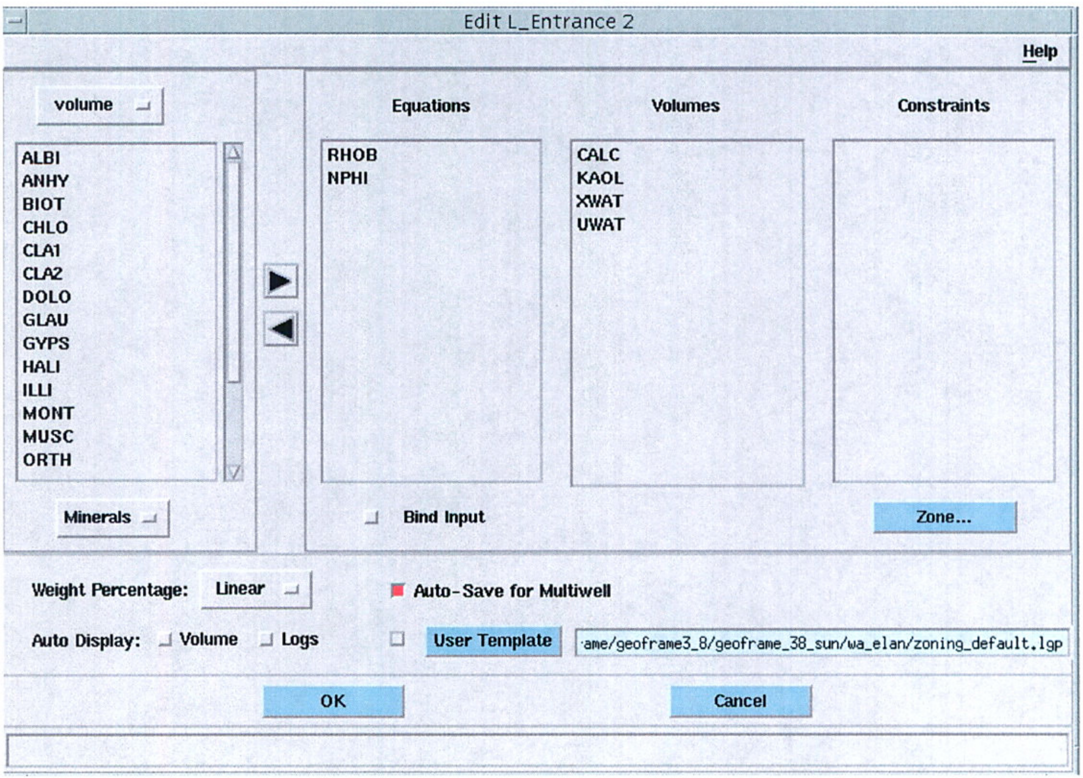
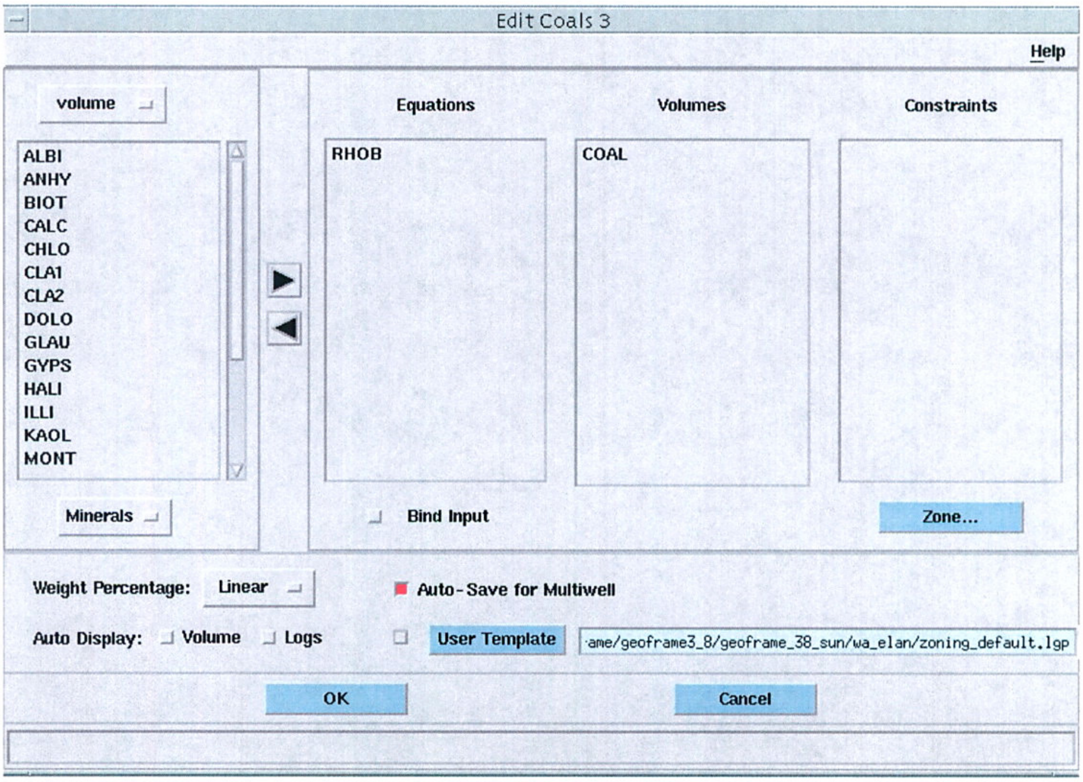


East Pilchard 1 Lakes Entrance Solve Process



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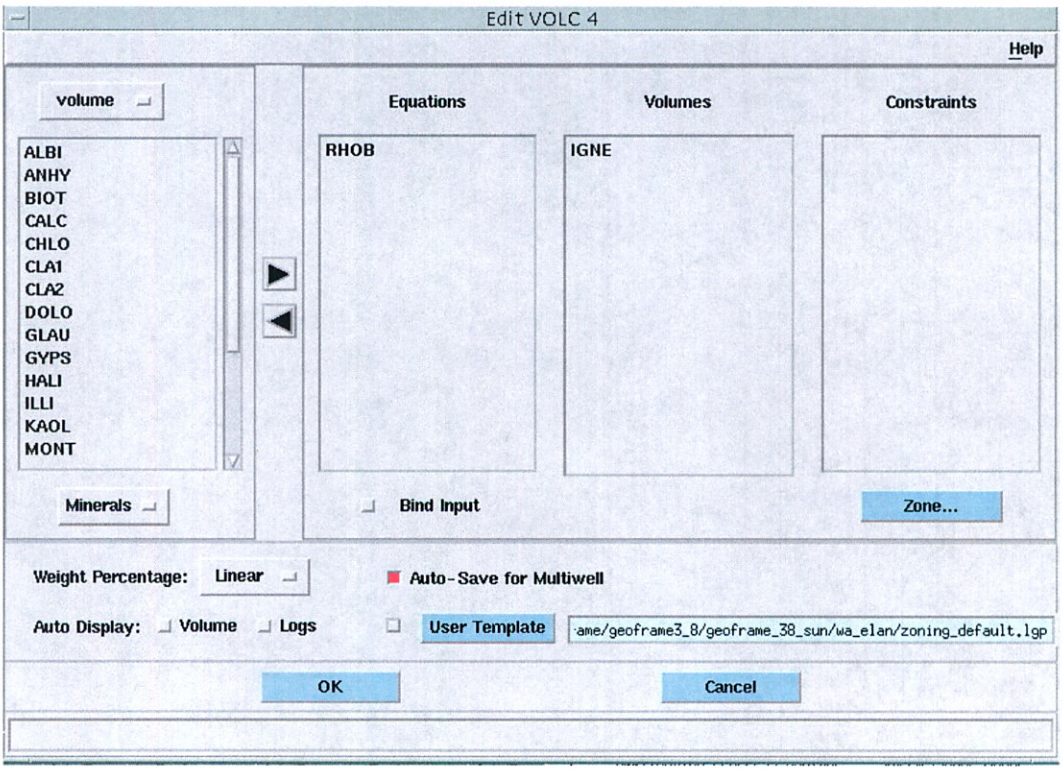

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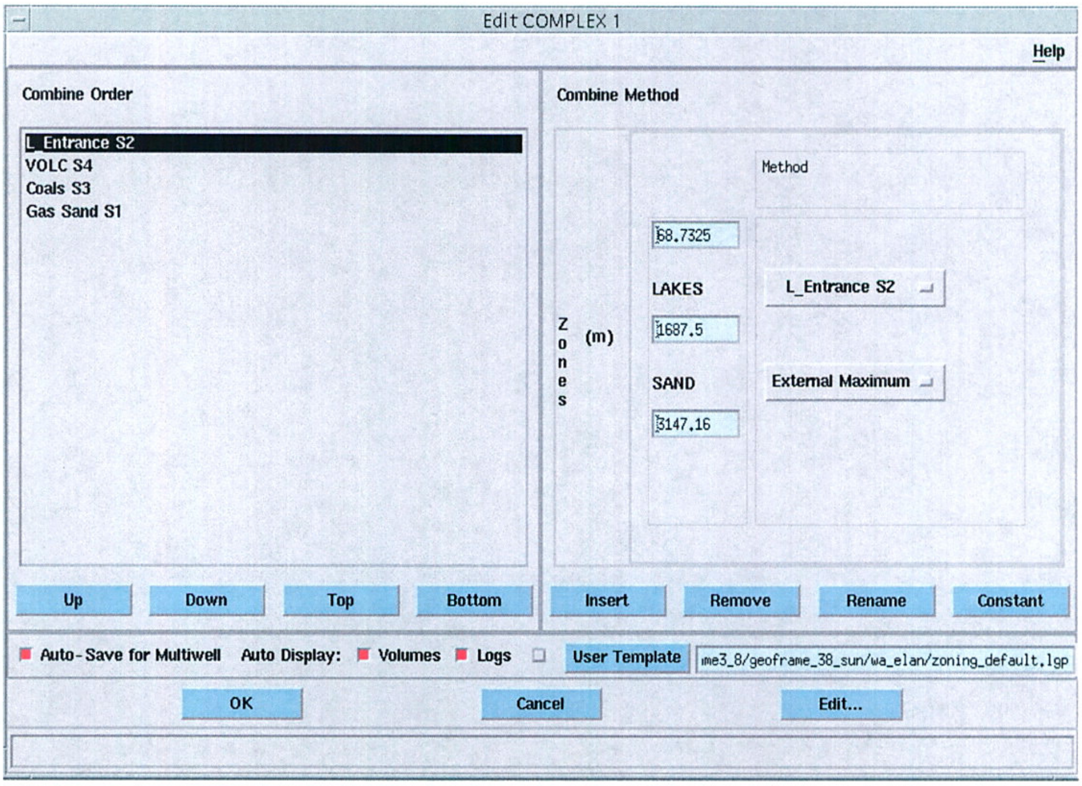

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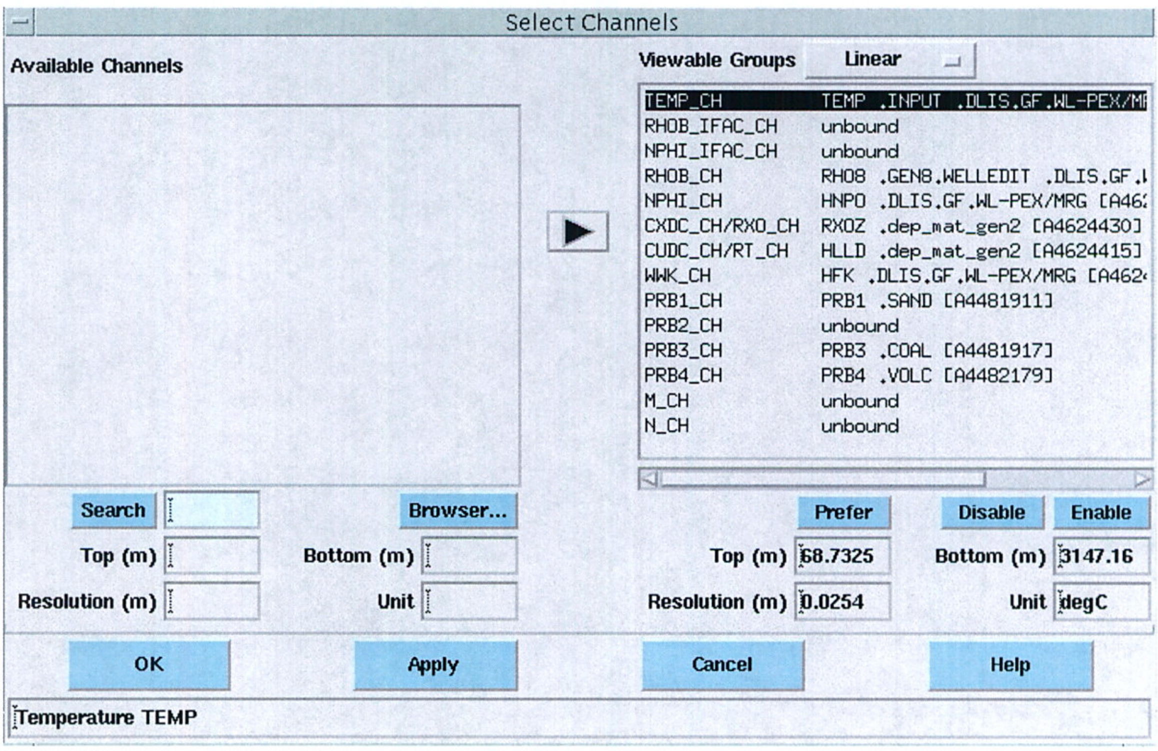
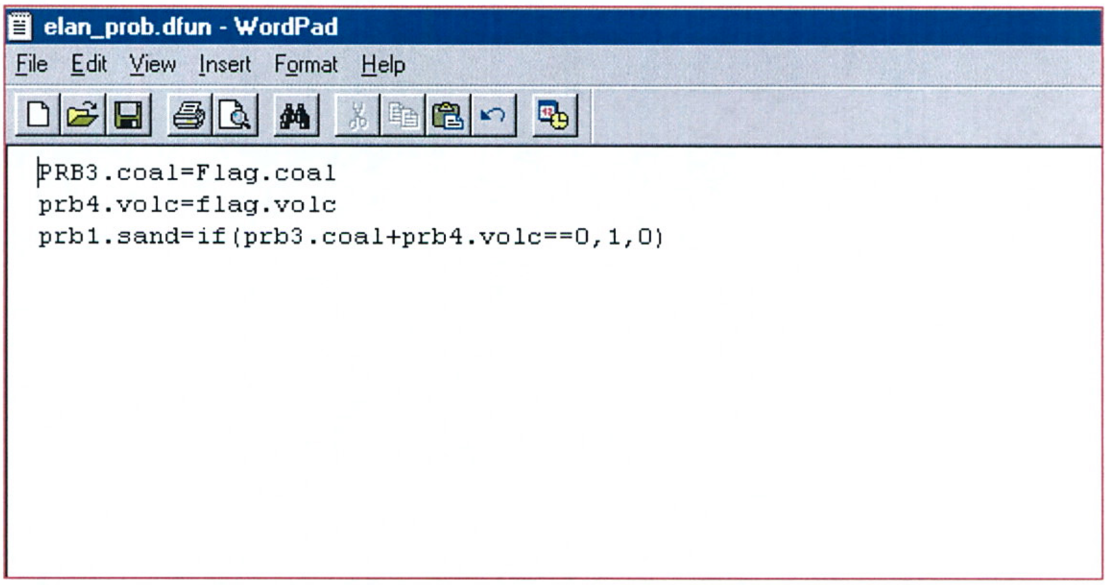
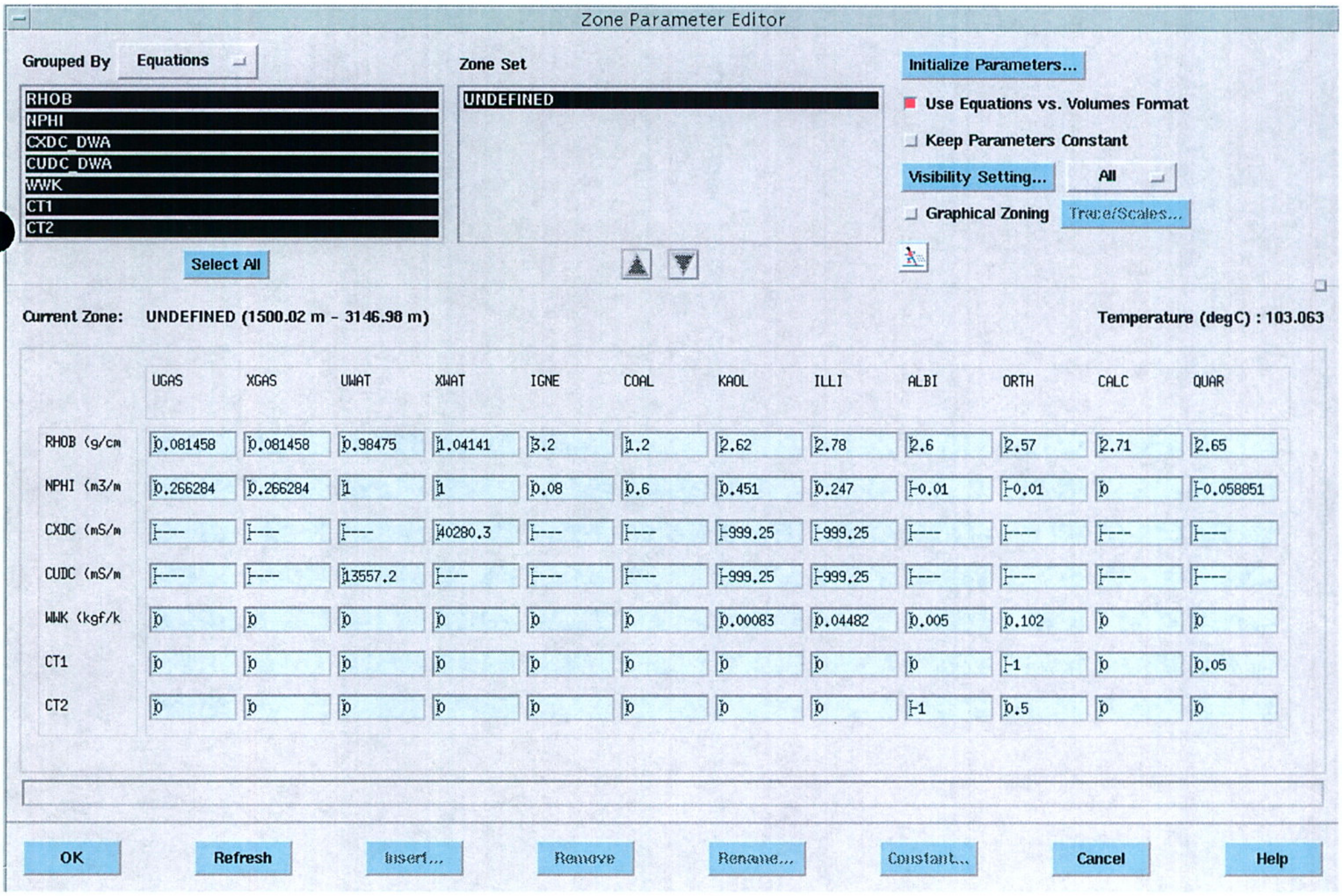


East Pilchard 1 Logs Used in Interpretation

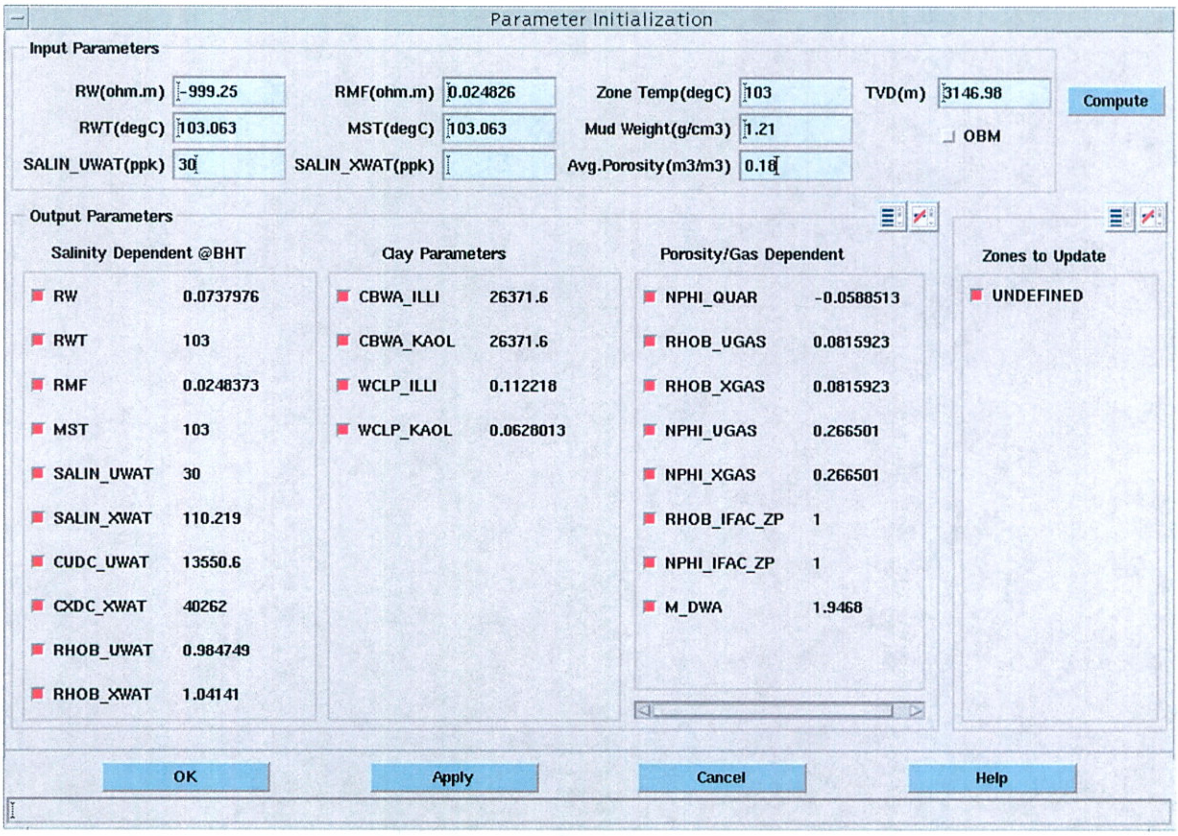
PE908923-color Ø29



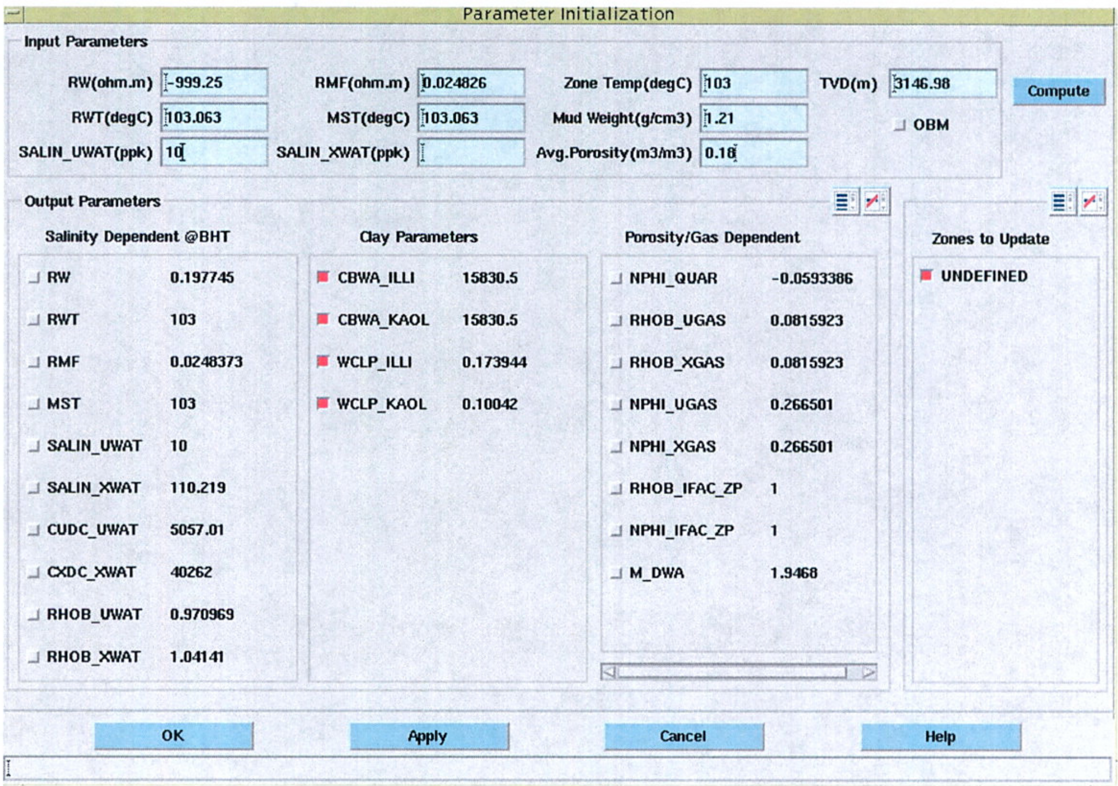
East Pilchard 1 Probability Functions used in the Combine Process



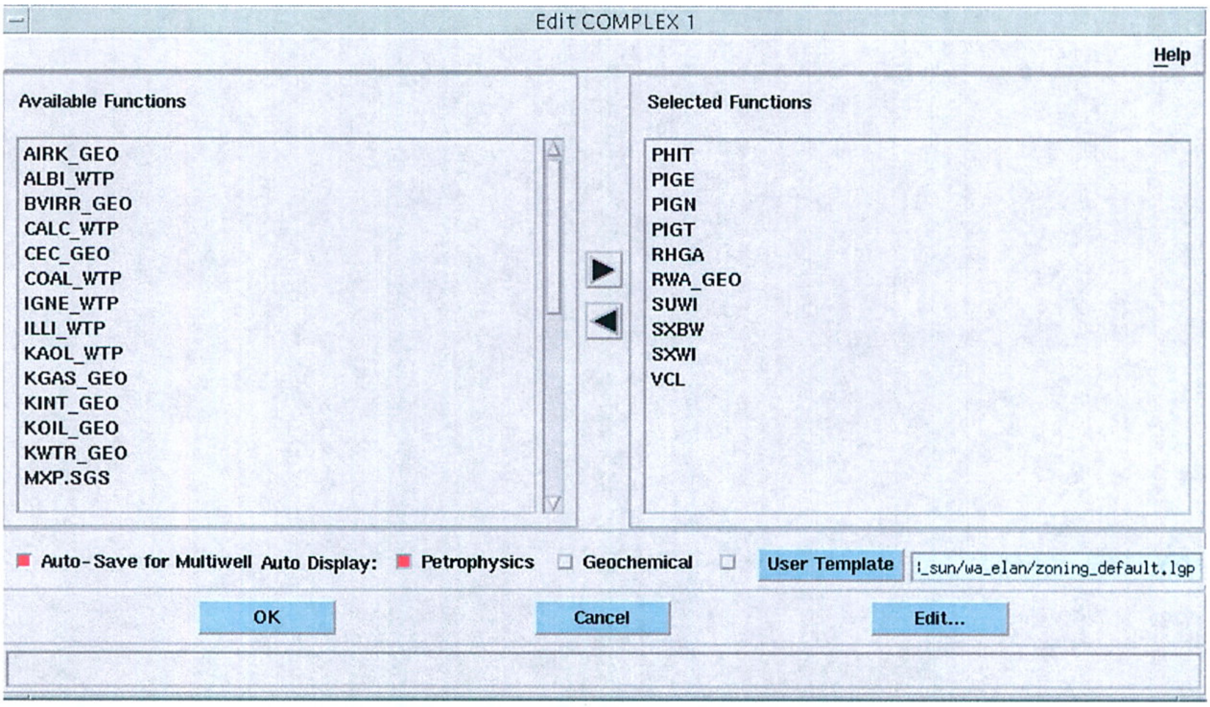
East Pilchard 1 Zone Parameters



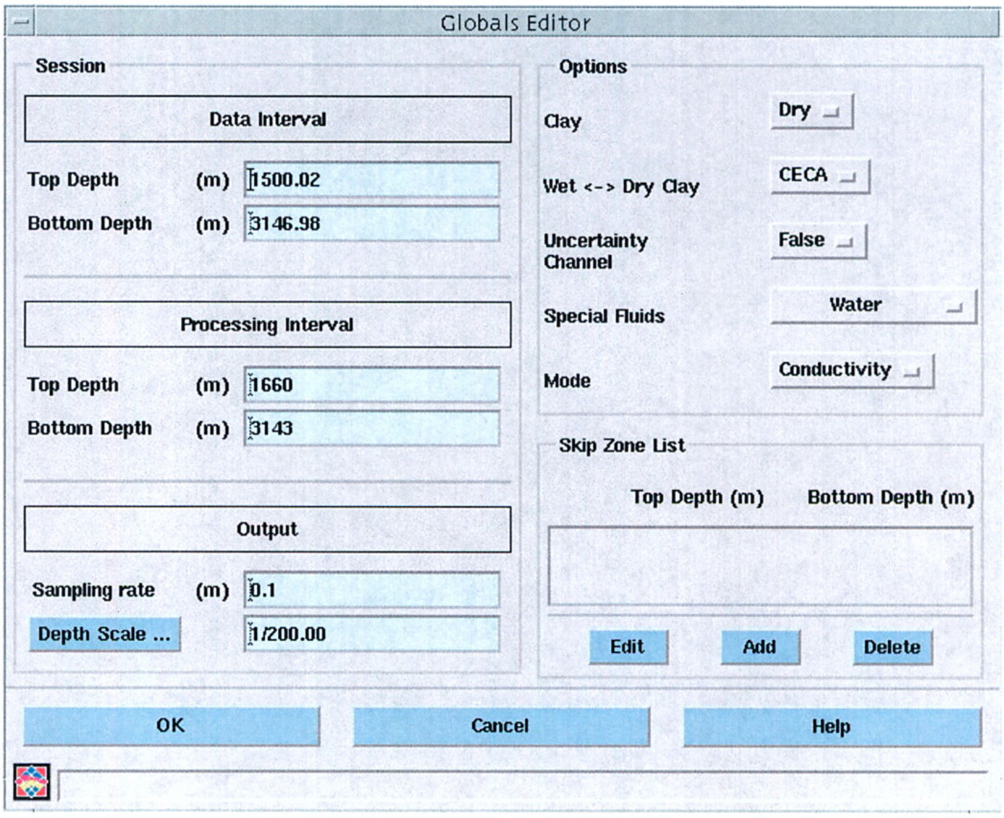
East Pilchard 1 Free Water Parameters



East Pilchard 1 Bound Water Parameters



East Pilchard 1 Function Process



East Pilchard 1 Globals

Constant Tools (CT1, CT2)

The following relationships were used for the Constant Tools

CT1

$0 = 0.05QUAR - ORTH$

Weight Multiplier = 0.5

CT2

$0 = 0.5ORTH - ALBI$

Weight Multiplier = 1

APPENDIX 2

MSCT Core Analysis Data

East Pilchard_1 MSCT Core Analysis												
Sample No	Depth	Amb He Porosity	Amb Perm to Air	Amb Klinkenberg Perm	Ovb Pressure	Ovb He Porosity	Ovb Perm to Air	Ovb Klinkenberg Perm	Grain Density	Remarks	ΔPor Amb-OB	Depth Shift
	(m)	*frac*	*(mD)*	*(mD)*	*(psi)*		*(mD)*	*(mD)*	*(g/cm³)*			*m*
3	2594.0	0.206	3750.000	3630.000	4400	0.182	3470.000	2890.000	2.64		0.024	0.00
4	2598.0	0.195	3280.000	2870.000	4400	0.159	2630.000	2600.000	2.64		0.036	-0.37
5	2602.0	0.192	1570.000	1460.000	4400	0.147	1290.000	1190.000	2.64		0.045	0.39
7	2620.0	0.060	0.004	0.001	4450	0.055	0.000	0.001	2.68		0.005	-0.87
8	2627.5	0.172	135.000	131.000	4450	0.148	117.000	112.000	2.64		0.024	0.00
9	2633.5	0.052	19.200	5.800	4500	0.022	0.410	0.170	2.36	Frac	0.030	-0.22
11	2644.0	0.019	0.001	0.001	4500	0.015	0.001	0.001	2.64		0.004	0.70
12	2652.0	0.079	0.018	0.001	4550	0.069	0.001	0.001	2.63		0.010	0.00
13	2663.0	0.160	30.800	26.300	4550	0.141	24.200	20.400	2.65		0.019	-0.62
15	2700.5	0.139	0.730	0.470	4650	0.119	0.320	0.150	2.64		0.020	0.00
17	2721.5	0.179	61.800	55.500	4700	0.160	53.300	48.300	2.65		0.019	0.00
18	2728.5	0.176	573.000	531.000	4700	0.140	463.000	444.000	2.64		0.036	0.28
19	2751.0	0.195	57.900	47.700	4750	0.166	41.700	31.800	2.66		0.029	0.37
21	2759.0	0.042	0.010	0.001	4750	0.037	0.001	0.001	2.60		0.005	0.70
22	2763.0	0.144	13.100	10.200	4800	0.101	6.100	4.660	2.66		0.043	0.51
23	2764.5	0.170	118.000	113.000	4800	0.147	94.800	83.200	2.65		0.023	0.28

APPENDIX 3

Wireline Logging Reports

FIELD ELECTRIC LOG REPORT

GENERAL INFORMATION

WELL:	**East Pilchard - 1**	**REPORT NUMBER 1**
LOCATION:	**Local:** Lat : 38° 11'54.184"S Long: 148° 33' 42.825"E **AMG:** X= 5,771,005.83 N Y= 636,764.56 E	Suite # 1 at 2945m **WATER DEPTH:** 91.3m **RT TO MSL:** 25m
PERMIT:	VIC/L9	**LOGGING COMPANY:** Schlumberger
AREA:	Bass Straits	**LOGGING ENGINEER:** Francisco/Rohan
COUNTRY:	Australia	**GEOLOGIST:** Arnaldo Ribeiro/M Woodmansee

LOGGING SUITE NUMBER 1

DATE LOGGED: 24/07/01 - 29/07/01	**DRILLERS DEPTH:** 2945m
HOLE SIZE: 12 1/4"	**LOGGERS DEPTH:** 2947.5m
CASING SHOE: 873m	**LOGGERS CASING SHOE:** 873m

LABEL	TYPE OF LOG	FROM	TO	RPT. SECT. / SUMMARY.	Time Since Last Circ / BHT
1	PEX-HALS-DSI-HNGS-LEHQT	2947.5	873.5	2695 - 2590m, GR recorded to 91m.	15:05 hrs/ BHT = 96.7°C, 97.2°C and 97.8°C
2	MDT-GR-LEHQT	1689.03	2926.5	93 pretests and 1 sample. 11 tight, 6 lost seal.	48:30 hrs/ BHT = 108.9°C, 108.9°C, 108.9°C
3	FMI-HRLA-GR-LEHQT	2947.5	2220	2922 - 2860m, HRLA rpt 2638 - 2575m.	52:40 hrs/ BHT = 109.4°C, 109.4°C, 109.4°C,
4	MDT-GR-LEHQT (for samples)	2593.5	2641.0	5 Sample points, all ok. 7 samples, 4 ok, 2 empty, 1 filtrate	14:20 hrs/ BHT 93.3°C, 92.2°C
4A	MDT-GR-LEHQT (for pressures, samples and OFA)	2602.0	2885.4	21 Sample points, 13 ok, 2 lost seal, 5 tight, 1 supercharged 8 samples, 3 OFA, 2 pretest	35:53 hrs/ BHT 107.8°C, 107.8°C, 108.9°C
5	MSCT-GR-LEHQT	2450	2878	Cut 25 cores, recovered 20. Recovery: 80%	44:54 hrs/ BHT 110°C, 110°C, 100°C

MUD DATA

MUD TYPE:	KCL/PHPA/Glycol/GEM	**SAMPLE SOURCE:**	Flowline
MUD WEIGHT:	10.15ppg	**Rm @ Measured Temp.**	0.0932@18.9°C
FUNNEL VISCOSITY:	64	**Rmf @ Meas. Temp.**	0.0761@18.9°C
pH:	10	**Rmc @ Measured Temp.**	0.210@18.9°C

FLUID LOSS	2.8	**Rm @ BHT.**	
CHLORIDES: **(Titration/Water phase)**	47000	**COMMENTS:**	Last circulation 12:00hrs on 24th july 2001.

CIRCULATION HISTORY & DIARY OF OPERATIONS

From	To	**Activity** (Downtime/Lost time in bold typeface)	Lost time
	22:30 hrs	**23-July-01** East Pilchard reached TD at 2945m	
22:30	12:00	Circulate bottoms up and pull out for a wiper trip to the shoe.	
12:00	18:45	**24-July-01** Pull out of the hole. Last Circulation at 2945m 12:00 hrs.	
18:45	19:00	JSA	

CIRCULATION HISTORY & DIARY OF OPERATIONS (cont)

From	To	Activity (Downtime/Lost time in bold typeface)	Lost time
19:00	20:20	Schlumberger rig up sheaves and rig up run #1 PEX-HALS-DSI-HNGS-LEHQT.	
20:20	20:30	Load Sources	
20:30	20:55	RIH to 934m.	
20:55	21:07	Open calipers and log up the shoe. Shoe found at 873.5m. Sonic check 55.6 us/ft. Caliper found to be 12.1" adjust to read 12.41". Close calipers.	
21:07	**21:40**	**RIH log down. Software crash. Due to Stopping and starting the log. Reboot (main processor) at 847m.**	**33 min**
21:40	22:40	RIH log down at 2500 to 3000 ft/hr. Missed 200m from 1425 to 1625, as the computer overloaded. Had to abort the log.	
22:40	**22:50**	**Reboot the system (main processor) at 1629m.**	**10 min**
22:50	23:10	Continue logging down from 1610m at 3500 ft/hr. Switch off Sonic processing, record only raw data, as the software wants to log it at 1500 ft/hr. Had to slow down to 1000 ft/hr. Computer buffer getting full. Stop log at 1850m.	
23:10	23:15	Switch off sonic.	
23:15	24:00	Continue down log from 1800m to 2450m at 3000 to 3500 ft/hr. Computer overloading. Stop log.	
00:00	**00:20**	**25-July-01. Stop and start software.**	**20 min**
00:20	00:37	Log down from 2360m to 2430m. Start logging at 1000 ft/hr, increase to 1500 ft/hr, then reduce to 500 ft/hr. Buffer getting overloaded. Stop log.	
00:37	**01:00**	**Reboot all computers, second processor and main processor.**	**23 min**
01:00	01:45	Log down from 2330m to 2947.5m at 3000ft/hr, increase to 4000 ft/hr, reduce to 3000 ft/hr	
01:45	02:50	Start log up parameters. Log up repeat section from 2695m to 2590m at 900ft/hr	
02:50	03:05	RIH to TD at 2947.5m	
03:05	05:07	Main log up from 2947.5m to 2435m at 900 ft/hr, in Very Hi res mode, DSI in P & S and Upper Dipole modes.	
05:07	**05:20**	**Computer buffer overloaded, log aborted**	**13 min**
05:20	07:23	Main log from 2489m.	
07:23	**07:27**	**1970m pre-empt computer buffer overloaded, log aborted, run in 70m then continue log up.**	**5 min**
07:27	09:25	Main log up to 1564m	
09:25	09:32	1564m, start recording in normal res, turn off dipole sonic, stop HNGS. Run in 80m to overlap logs.	
09:32	10:10	log up at 3400 ft/hr, at normal res.	
10:10	**10:17**	**Computer buffer overloaded, log aborted 990m. Run in 80m, re-set system.**	**7 min**
10:17	10:33	Log up, normal resolution. Casing shoe logged at 874 m.12.41", sonic 57.5 us/ft	
10:33	10:55	Log up, normal resolution.	
10:55	11:00	**Computer buffer overloaded, log aborted 430m. Run in 40m, re-set system.**	**5 min**
11:00	11:20	PEX logging run finished. unload sources and rig down. Bottom hole temp recorded 206°,207°,208°F (96.7, 97.2, 97.8°C)	
11:20	12:00	Unload sources and rig down. PEX	
12:00	13:45	Rig up run (#2) MDT-GR-LEHQT	

CIRCULATION HISTORY & DIARY OF OPERATIONS (cont)			
From	**To**	**Activity** (Downtime/Lost time in bold typeface)	**Lost time**
13:45	14 :50	Run in hole MDT-GR-LEHQT	
14:50	15:05	Gamma correlation at 1680m crank 0.4m up.	
15:05	17:30	Commenced MDT Pressure Tests, 12 pressure tests.	
17:30	17:34	Correlate Gamma at 1967m	
17:34	18:50	Re-commence MDT pressure tests.	
18:50	**19:00**	**Software crash. Restart computer at 2152m.**	**10 min**
19:00	19:10	Re-commence MDT pressure tests.	
19:10	19:17	Correlate Gamma at 2300m	
19:17	22:22	Re-commence MDT pressure tests.	
22:22	22:30	Correlate Gamma at 2602m	
22:30	00:20	**26-July-01** Re-commence MDT pressure tests.	
00:20	00:28	Correlate Gamma at 2650m	
00:28	06:10	Re-commence MDT pressure tests.	
06:10	06:20	Correlate Gamma at 2800m. No offset	
06:20	10:37	Re-commence MDT pressure tests.	
10:37	11:10	Running last sample (at 2925.5m) start pumping through OFA.	
11:10	11:58	Slow down sampling pump to 300rpm for 2 litres	
11:58	12:30	Pump to sample chamber, final pressure 3000psi	
12:30	12:43	Close sample chamber, and retract.	
12:43	13:40	Pull out of the hole, Last BHT at 11:10hrs 112.83°C	
13:40	14:30	Rig down MDT run (#2). LEHQT thermometers 108.9°C	
14:30	15:20	Rig up Run # 3 FMI-HRLA-GR-LEHQT	
15:20	15:35	Run in Run # 3 to casing shoe, and check calipers. 12.40" and 12.42" in tolerance.	
15:35	16:28	Run to bottom	
16:28	16:40	Log repeat section (from 2922m to 2860m), crank depth 0.2m up.	
16:40	18:10	Start main log. Tag bottom at 2947.5m. FMI to 2220m, HRLA to 2575m	
18:10	**18:30**	**RIH to 2650m. Log up HRLA at 1700 ft/hr from 2650m to 2575m,**	**20 min**
18:30	20:10	POOH, thermometer readings 109.4°C. Rig down tools and remove Schlumberger sheaves.	
20:10	12:00	RIH with Security XL20D, run wiper trip. Last circulation 06:00 hrs, 27-07-01	

MUD DATA

MUD TYPE:	KCL/PHPA/Glycol/GEM	**SAMPLE SOURCE:**	Flowline
MUD WEIGHT:	10.15ppg	**Rm @ Measured Temp.**	0.0932@18.9°C
FUNNEL VISCOSITY:	64	**Rmf @ Meas. Temp.**	0.0761@18.9°C
pH:	10	**Rmc @ Measured Temp.**	0.210@18.9°C
FLUID LOSS	2.8	**Rm @ BHT.**	
CHLORIDES: (Titration/Water phase)	47000	**COMMENTS:**	Last circulation 06:00hrs on 27th July 2001.

CIRCULATION HISTORY & DIARY OF OPERATIONS (cont)

From	To	Activity (Downtime/Lost time in bold typeface)	Lost time
12:00	13:05	**27-July-01** Run in hole run # 4 MDT-GR-LEHQT	
14:10	14:17	Gamma correlation at 2590m. Crank up 0.3 m.	
14:17	14:33	Run down, and transfer OFA calibration.	
14:33	15:49	Sample point 2593.5m, MRMS and 1 Gallon sample. (see MDT report for timings)	
15:49	16:29	Move to sample point 2596m, MRMS sample. (see MDT report for timings)	
16:29	17:17	Move to sample point 2602m, MRMS sample. (see MDT report for timings) suspect sample chamber opening	
17:17	17:50	Move to sample point 2627.5m, MRMS sample. (see MDT report for timings) suspect chamber opening.	
17:50	**18:50**	**Chamber seal problem. No indication of opening the sample chambers. Analyse logs**	**01:00**
18:50	**19:35**	**Get off the wall, retract probe – to test MDT tool. Attempted to pump up – successful. Move string pump down, screens blocked, clean up.**	**00:45**
19:35	19:45	GR correlate from 2640m. 0.2m deeper. Correct depth.	
19:45	**20:20**	**Move to sample point 2641.0m, MRMS sample. (see MDT report for timings). Pump working intermittently.**	**00:35**
20:20	**21:00**	**POOH and check MDT**	**00:40**
21:00	**23:30**	**Redress multisample chamber, swap sample chambers, change pump out sub. Pump out full of sand. No sample recovery at 2602m, and 2627.5m.**	**02:30**
23:30	**23:50**	**MDT tool check.**	**00:20**
23:50	**01:00**	**RIH to 2660m**	
01:00	01:12	**28-July** GR correlated from 2660m. 0.6m shallower, correct depth	
01:12	02:50	Move to sample point 2602.0m, MRMS sample. (see MDT report for timings)	
02:50	0:430	Move to sample point 2627.5m, MRMS sample. (see MDT report for timings). **From 03:50 hrs have trouble opening the sample chamber**. At 04:05hrs opened second sample chamber	**00:15**
04:30	04:43	Move to sample point 2641.0, MRMS sample. (see MDT report for timings). Lost seal. Retract probe, reset, tight formation.	
04:43	05:15	Move point down 0.3m to 2641.3m. Slow pretest, low mobility 0.8. Began pumping at 300rpm (pumped 0.5L in 7 minutes), produced a draw down of 2200psi. Abort and retract.	
05:15	05:27	Move point up to 2640.8m. Tight formation. Abort point	
05:27	05:37	GR correlation from 2655m. 0.2m deeper, correct depth.	
05:37	06:32	Move to sample point at 2641.0m. Begin pumping 05:50.	
06:32	07:23	Wait on Build Up at 2641m, complete pretest and retract.	
07:23	07:40	Move to sample point 2663m, Formation tight, move to 2663.2m	
07:40	09:42	On station sample point 2663.2m, MRMS sample and Build Up. (see MDT report for timings) Shut in for 53min. Unlatch and move to next sample station.	

CIRCULATION HISTORY & DIARY OF OPERATIONS (cont)

From	To	Activity (Downtime/Lost time in bold typeface)	Lost time
09:42	10:07	On station sample point 2667.5m, MRMS sample. Conduct pretest, formation pressure to high, reset packer.	
10:07	**10:35**	**Sample pump only pumping on one stroke. Abort sampling and trouble shoot pump from surface.**	**00:28**
10:35	11:09	Re-commence pumping out at 2667.5m	
11:09	11:20	Move to station 2724m, for pre-test. Tight abort and move down 0.5m	
11:21	11:34	2724.5m pre-test.	
11:34	11:43	Move to Station 2726.5m and conduct pre-test.	
11:45	13:22	Move to Station 2728.5m Sample 1 gallon and 450cc. One gallon chamber failed to open divert to second One Gallon chamber.	
13:22	13:40	Move to Station 2756m Sample 450cc.	
13:40	**14:10**	**Pump stopped, only pumping on one stroke. Trouble shoot pump from surface.**	**00:30**
14:30	14:36	Commenced pumping at 2756m, and take 450cc sample	
14:36	15:06	Move to Station 2759m, OFA analysis "gas" no sample taken.	
15:06	15:17	Move to Station 2763m. Test aborted "supercharged", move down 0.5m	
15:17	15:28	Move to Station 2763.5m, Test aborted seal failure.	
15:28	15:42	Retract, and Re-Set tool with 20cc Draw Down, seal ok. Conduct OFA analysis.	
15:42	**15:45**	**Pump stopped, only pumping on one stroke. Trouble shoot pump from surface.**	**00:03**
15:45	16:03	Pump fixed resume pumping sample through OFA at 2763.5m	
16:03	16:45	Move to Station 2792m, collect 2 X 450cc samples.	
16:45	**16:50**	**Problem with Strain gauge - Pump down through equalization valve to help stabilize Strain Gauge. Problem not resolved. 16:45 -**	**00:05**
16:50	17:05	Move to Station 2885m, OFA analysis. Formation tight, retract tool and move down 0.5m.	
17:07	17:53	Move to Station 2885.4m. OFA analysis indicates gas no sample taken.	
17:53	19:03	Finished MDT and Pull out of hole.	
19:03	20:11	Rig down MDT tools	
20:11	21:10	Check MSCT coring tools.	
21:10	22:15	RIH MSCT	
22:15	22:30	GR Correlate, found to be 2m deep.	
22:30	22:36	MSCT core point @ 2450m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
22:36	22:48	MSCT core point @ 2586m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
22:48	22:59	MSCT core point @ 2594m. Anchor shoe open and start coring. Stop coring and close anchor shoe. Hard Formation.	
22:59	23:09	MSCT core point @ 2598m. Anchor shoe open and start coring. Stop coring and close anchor shoe. Hard Formation.	
23:12	23:18	MSCT core point @ 2602m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
23:20	23:24	MSCT core point @ 2610m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
23:25	23:29	MSCT core point @ 2620m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
23:31	23:38	MSCT core point @ 2627.5m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	

CIRCULATION HISTORY & DIARY OF OPERATIONS (cont)

From	To	Activity (Downtime/Lost time in bold typeface)	Lost time
23:39	23:42	MSCT core point @ 2633.5m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
23:44	23:55	RIH and GR correlate. On depth.	
23:57	00:03	MSCT core point @ 2641m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
00:03	00:14	MSCT core point @ 2644m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
00:14	00:21	MSCT core point @ 2652m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
00:21	00:36	MSCT core point @ 2663m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
00:36	00:43	MSCT core point @ 2669m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
00:43	00:50	MSCT core point @ 2700.5m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
00:50	01:00	MSCT core point @ 2708.5m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
01:00	01:08	**29-July-01** MSCT core point @ 2721.5m. Anchor shoe open and start coring. Stop coring and close anchor shoe. Hard formation.	
01:08	01:25	MSCT core point @ 2728.5m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
01:25	01:32	RIH to 2650m. GR correlate. Shallower by 0.1m	
01:32	01:45	MSCT core point @ 2751m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
01:45	01:57	MSCT core point @ 2754m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
01:57	02:18	MSCT core point @ 2759m. Anchor shoe open and start coring. Stop coring. Problems with stalled coring motor. Close anchor shoe.	
02:19	02:25	MSCT core point @ 2763m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
02:27	02:33	MSCT core point @ 2764.5m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
02:37	02:45	MSCT core point @ 2783.0m. Anchor shoe open and start coring. Stop coring and close anchor shoe. Hard formation.	
02:50	02:57	RIH 2895m. GR correlate. Shallower by 0.1m, shift down.	
02:57	03:06	MSCT core point @ 2878.5m. Anchor shoe open and start coring. Stop coring and close anchor shoe.	
03:06	04:05	Pull out of hole MSCT. Cut 25 cores, recovered 20. Had loaded 29 rings (Blank, 10 grooved rings, Marker ring, 10 grooved rings, Marker ring, 6 grooved rings) in the MSCT tool. When tool opened found 33 rings (**Blank, 3 grooved rings**, Blank, 10 grooved rings, Marker ring, 10 grooved rings, Marker ring, 6 grooved rings). MSCT core lithology correlated with the logs, the two volcanic cores and the sixth shale core were found to be in the correct sequence. Indicating that the additional **Blank and 3 grooved rings** were left in the tool from a prior job had not been removed when loading the MSCT.	
04:05	04:15	Rig down Schlumberger	

HOLE PROBLEMS

There were no hole problems encountered. The hole was in good shape, except for a few places in the Volcanics where it was washed out.

COMMENTS

Run 1: PEX-HALS-DSI-HNGS-LEHQT. Had to slow down whilst logging down due to numerous software crashes. The software patch which was installed prior to the job, was faulty.
Run 2: MDT-GR-LEHQT. No serious problems during this run, except for 6 seal failures, and once the probe was leaking.
Run 3: FMI-HRLA-GR-LEHQT. Had to relog the HRLA from 2638m to 2575m to reconfirm the repeat of the resistivity data which had QC flags marked at places.
Run 4: MDT-GR-LEHQT. Had sample chamber seal problems at 2627.5m. After trouble shooting found that the pump out was the problem. Pulled out of hole, and found that 2 x 450cc sample chambers were empty.

Run 4A: MDT-GR-LEHQT Found sample pump pumping on one stroke at 2667.5m, 2756m, and 2763.5m. The strain gauge stopped working from 2792m @ 16:45 hrs on the 28th "July.

Run 5: MSCT-GR-LEHQT: Pull out of hole MSCT. Cut 25 cores, recovered 20. Had loaded 29 rings (Blank, 10 grooved rings, Marker ring, 10 grooved rings, Marker ring, 6 grooved rings) in the MSCT tool. When tool opened found 33 rings (**Blank, 3 grooved rings**, Blank, 10 grooved rings, Marker ring, 10 grooved rings, Marker ring, 6 grooved rings). MSCT core lithology correlated with the logs, the two volcanic cores and the sixth shale core were found to be in the correct sequence. Indicating that the additional **Blank and 3 grooved rings** were left in the tool from a prior job had not been removed when loading the MSCT.

FIELD ELECTRIC LOG REPORT

GENERAL INFORMATION

WELL:	**East Pilchard - 1**	**REPORT NUMBER 1**
LOCATION:	**Local:**	Suite # 2 at 3138m RT
	Lat : 38° 11'54.184"S	
	Long: 148° 33' 42.825"E	
	AMG: X= 5771005.83 N	**WATER DEPTH:** 91.3m
	Y= 636764.56 E	
		RT TO MSL: 25m
PERMIT:	VIC/L9	**LOGGING COMPANY:** Schlumberger
AREA:	Bass Straits	**LOGGING ENGINEER:** Francisco/Rohan
COUNTRY:	Australia	**GEOLOGIST:** Arnaldo Ribeiro/M Woodmansee

LOGGING SUITE NUMBER 2

DATE LOGGED: 02/08/01 - 05/08/01	**DRILLERS DEPTH:** 3138m
HOLE SIZE: 12 1/4"	**LOGGERS DEPTH:** 3140.6
CASING SHOE: 873m	**LOGGERS CASING SHOE:** 873m

LABEL	TYPE OF LOG	FROM	TO	RPT. SECT. / SUMMARY.	Time Since Last Circ / BHT
1	TLD-HGNS-HNGS	3139m	2870m	Repeat 3139m - 3078m	9:40 hrs/ BHT = 97.8°C, 97.8°C and 98.9°C
2	HALS-HGNS-DSI-LEHQT	3139m	2870m	Repeat 3139m - 3080m	14:46 hrs/ BHT = 103.3°C, 103.3°C, 102.2°C
3	MDT-GR-LEHQT (for pressures)	2825.5m	2956.2m	17 pre-tests, 9 dry,2 lost seal, 1 tight, 5 good.	Did not reach TD.
4	DUAL-CSAT-VSP	3140m	146m	Check shot at 1775m	38:11 hrs/BHT = 111.1°C, 113.9°C,110°C
5	MDT-GR-LEHQT (for pressures and samples)	2825.5m	3125.5m	41 pre-tests. 13 good, 12 lost seal/supercharged, 12 tight, 8 samples taken from 4 depths 7 recovered	70:45 hrs/ BHT 117.7°C, 118.3°C, 118.9°C, 122.5°C
6	CST-GR	3134m	1650m	Shot 60 cores shot, 54 recovered, 2 Empty, 4 miss fire	

MUD DATA

MUD TYPE:	KCL/PHPA/Glycol/GEM	**SAMPLE SOURCE:**	Flowline
MUD WEIGHT:	10.1ppg	**Rm @ Measured Temp.**	0.1020@15.6°C
FUNNEL VISCOSITY:	61	**Rmf @ Meas. Temp.**	0.0883@15.6°C
pH:	9.5	**Rmc @ Measured Temp.**	0.2055@15.6°C
FLUID LOSS	2.8	**Rm @ BHT.**	

CHLORIDES: (Titration/Water phase)	46000	COMMENTS:	Last circulation 22:40hrs on 01st Aug 2001.

CIRCULATION HISTORY & DIARY OF OPERATIONS

From	To	Activity (Downtime/Lost time in bold typeface)	Lost time
	09:00 hrs	**01-Aug-01** East Pilchard reached TD at 3138m	

CIRCULATION HISTORY & DIARY OF OPERATIONS (cont)

From	To	Activity (Downtime/Lost time in bold typeface)	Lost time
09:00	15:45	Circulate bottoms up and pull out for a wiper trip to the shoe.	
15:45	05:35	**02-Aug-01** Pull out of the hole. Last Circulation at 3138 m 22:40 hrs on 1st Aug.	
05:35	05:45	JSA	
05:45	06:25	Schlumberger rig up sheaves and rig up **Run #1 TLD-HGNS-HNGS**.	
06:25	06:45	Load Sources	
06:45	06:50	Compensate up	
06:50	07:04	RIH to 910m.	
07:04	07:11	Open calipers and log up the shoe. Shoe found at 873.2m. Caliper found to be 12.83" adjust to read 12.41". Close calipers.	
07:11	07:57	RIH (8350ft/hr – 10100ft/hr) to 2870m	
07:57	08:20	Start logging down at 2870m at 2500ft/hr.	
08:20		Tag bottom at (bottom of hole washed out to 24" inches)	
08:20	08:38	Start repeat section from TD to 3078m.	
08:38	08:47	Running back to bottom.	
08:47	10:01	Start main log TD to 2870m. Very Hi-Res 900ft/hr, 3083m minor overpull	
10:01	10:25	Pull out of the hole. Re-process data and depth correct. TD corrected to 3140.6m	
10:25	11:30	Break down tools	
11:30	12:00	Make up **Run #2 HALS-HGNS-DSI-LEHQT**	
12:00	12:12	Run into hole Run #2	
12:12	12:16	Casing check, casing shoe 873m, sonic 57.2us/ft	
12:16	12:53	Run in hole to 2850m	
12:53	13:13	Log down from 2870m to TD. Tag TD at	
13:13	13:22	Log repeat section TD to 3080m,	
13:22	13:26	Run back to bottom	
13:26	14:00	Log main log, HALS-DSI in P & S in Upper Dipole Mode	
14:00	14:50	Pull out of hole	
14:50	15:10	Rig down Run #2	
15:10	16:30	Rig up **Run #3 MDT-GR-LEHQT**	
16:30	16:45	Surface checks	
16:45	**17:45**	**Run into hole Run #3 to 2088m, could not communicate with PS (probe).**	**01:00**
17:45	**18:15**	**POOH to 700m checking tool. Started to work. (moisture in tool the cause)**	**00:30**
18:15	18:50	RIH to 2825m	
18:50	19:00	Gr correlate 1m shallower. Adjust depth	

19:00	19:08	RIH to 2825m, check GR again. Need good correlation as we have thin sands. 0.1m deeper. Adjust depth	
19:08	19:30	At station 2825.5m, observed pretest pressure drop to 33psia, redo test. Dry test.	
19:30	19:40	At station 2833m,	
19:40	19:53	RIH to 2873m, correlate, adjust 0.3m	
19:53	20:03	At station 2825.64m. Dry test	
20:03	20:07	At station 2829.99m. Dry test	
20:07	20:16	At station 2830.33m. Lost seal	
20:16	20:27	At station 2885.31m. Lost seal	
20:27	21:13	continue stations to sample 9	

CIRCULATION HISTORY & DIARY OF OPERATIONS (cont)

From	To	**Activity** (Downtime/Lost time in bold typeface)	Lost time
21:13	21:19	Gr correlate, from 2930m, shallow by 0.3m. Adjust depth	
21:19	22:15	Suspect tool at stations on less permeable sands	
22:15	**22:55**	**Check tool at 2936.36m and redo a pretest and pump out. Found formation pressure build up very slow after stopping the pump.**	**00:40**
22:55	23:10	Pretest at 2950.5m. OK	
23:10	**23:15**	**Prestest at 2956.2m. Dry test again. Decide to check tool at surface**	**00:05**
23:15	**00:34**	**POOH. Tool at surface.**	**01:19**
00:34	**01:25**	**03-Aug-01 Lay down sample chamber, clean and check tool. Probe filter found to be partially clogged with mud cake, but was still OK. Found slow hydraulic pressure leak in the tool. Decided to change to the back up tool.**	**00:51**
01:25	**02:00**	**Change MDT tool (change HY and PS).**	**00:35**
02:00	**03:05**	**Rig up Run #3A MDT-GR-LEHQT. Check PS, OK. RIH to 80m.**	**01:05**
03:05	**04:45**	**Unable to communicate with PS. Telemetry problem. Disconnect tools. Found connector problem. Function test probe. OK. Pump silicone oil from a hole in the tool, which came out through the probe. Probe OK.**	**01:40**
04:45	**04:48**	**Tool zero, and RIH to 80m. Encountered same problem as 03:05 hrs. Unable to communicate with PS. Telemetry problem. Everytime the tool is in the mud, we have the problem.**	**00:03**
04:48	**05:55**	**POOH and disconnect head. Check insulation, OK. Change PS module used in run #3**	**01:07**
05:55	**06:21**	**Check tool, connect MRMS and RIH.**	**00:26**
06:21	07:30	Rig up **Run #4 DUAL CSAT-VSP**	
07:30	07:40	Run in hole Run #4	
07:40	09:00	Test air gun and tune, test surface acquisition at 768m. gun set 5m below sea level.	
09:00	09:33	Finished check shot at 768m correct to 757m (330.17ms) after Gamma correlation at 1775m	
09:33	10:25	Run down to 1775m and Gamma (crank up 11.0 m) correlate for check shot. top 684.48ms bottom 694.0ms	
10:25	11:12	Run down to 3005m function test tool ok , bottom sensor 1023.23ms top sensor 1020.95ms	
11:12	11:22	Gamma correlation at 3100m crank 0.2m	

11:22	12:51	Increase air pressure to 2050psi, tag bottom at 3140m start velocity survey first point 3140m, take velocities every 15m with extra specified depths. (measure 14 stations)	
12:51	13:45	Hoist air guns out of the water to clear crane for chopper arrival / departure. Three guns working.	
13:45	15:19	Continue VSP from station 2930m going up. Gamma tracked for correlation while moving between stations.	
15:19	15:53	Hoist air guns out of the water to clear crane for chopper arrival / departure	
15:53	21:07	Continue VSP from station 2720m going up. Gamma tracked for correlation while moving between stations. Adjust depth by 0.1m at station 2240m.Adjust depth at station 1970m, by 0.15m (deeper).Check shot at 1775 repeated. OK(684.72 and 684.48ms). Adjust depth at 1730m, 0.1m deeper.	
21:07	23:15	Take check shots from 1476m.	
23:15	23:40	POOH.	
23:40	00:12	**4 Aug 2001** Rig down DUAL CSAT-VSP	
00:12	01:25	**Rig up run #5 MDT-GR-LEHQT**	

CIRCULATION HISTORY & DIARY OF OPERATIONS (cont)

From	To	Activity (Downtime/Lost time in bold typeface)	Lost time
01:25	**05:15**	**Found a leak in the rope socket. Cut the cable and terminate it. Still have a leak in one of the conductor wires. Found two cables with their shields partially cut in the collector of the cable drum. Terminate it. Cut 5meters of the cable at the rope socket end, and terminate it. Still have a leak. Rewire it so that the MDT can use 6 wires out of seven.**	**3:50**
05:15	05:50	Rig up and RIH to 935m.	
05:50	06:38	Check Probe function at 935m.	
06:38	06:53	Correlate Gammar, reset up 0.4m, @ 2670	
06:53	07:03	On first station 2825.5m	
07:03	07:06	Having trouble getting draw down above 0.7cc	
07:06	07:22	Resume test, lost seal, reset, good test.	
07:22	09:38	Complete tests, pre-tests 2830.0m, 2833.0m, 2925.53m, 2926.8m, 2934.0m, 2936.6m, 2947.6m, 2950.8m, 2956m. strain gauge failed at 09:38 hrs on test 2956m. 600 psi pressure increase when unlatching.	
09:58	10:24	On sample station 2965m pre-test and two MRSM samples 1 certified 1 none certified.	
		Pre-test reservoir pressure to high re-set packer, try pump to achieve packer seal. conduct pre-test. Suspect high pressure move up 0.5m	
10:24	11:53	On station 2965.5m good pre-test, divert through OFA, fill 2 X 450cc MRSM chambers, I certified one none certified. poor indication of first chamber opening divert to new chamber. fill 2 chambers, conduct 38min build up.	
11:53	14"03	Pre-test 3025.0m tight, 3025.2m tight, 3025.8m OK, 3027.2m tight, 3027.5 super charged, 3028.4m tight, 3033.2 m OK, 3035.1m tight, 3034.5m ok, 3047.9m tight.	
14:03	14:15	Gamma Correlation at 3070m, crank 0.9 down.	
14:15	14:15	Move to sample station 3074.5m. to tight to sample move to 3074.7m supercharged	
14:50	14:56	Re-check Gamma at 3070m	
14:56	15:17	Move to sample station 3074.3m. Probably supercharged, attempt pump out DD 2000 psi. draw down abort test.	
15:17	16:14	Move to next sample point 3077.0m tight, 3080.9m tight, 3089.0m tight, 3093.8m supercharged	

16:14	17:27	sample point 3095m Pre-test and divert to OFA and take two 450cc MRSM samples	
17:27	17:40	Move to sample station 3103.5m supercharged/leaking	
1740	18:43	3103.8m Pre-test and divert to OFA and take two 450cc MRSM samples	
1843	19:50	Move to station 3110.2m super charged, 3110.5m tight, 3114m super charged, 3115.1 leaking, 3116.8m leaking, 3121m leaking	
19:50	21:17	3122m pre-test, divert to OFA, collect 2 X 450cc MRSM samples	
21:17	21:25	Station 3125.5m , tight.	
21:25	22:30	Pull out of hole Run # 5	
22:30	23:20	rig down run #5 MDT-GR-LEHQT	
23:20	00:12	**5 August 2001** Prepare Rig up for **Run #6 CST-GR**	
00:15	00:36	JSA undertaken for procedure	
00:36	01:54	RIH to 3100 m	

CIRCULATION HISTORY & DIARY OF OPERATIONS (cont)

From	To	Activity (Downtime/Lost time in bold typeface)	Lost time
01:54	01:57	Gamma correlation at 3100m on depth.	
01:57	02:03	Run to bottom	
02:03	03:16	Pull up firing each bullet while stationary, 3134, 3130?, 3127, 3115, 3088, 3087, 3072, 3056, 3018?, 3005, 2997, 2965, 2959?, 2943, 2932?, 2911, 2905, 2985, 2887, 2875, 2857, 2850, 2835, 2821, 2810, 2800, 2771, 2761, 2747, 2730?, 2698.	
03:16	03:18	Gamma correlate at 2700m on depth.	
03:18	04:57	Move to next sample and fire at 2690m, 2675, 2654, 2647, 2613, 2604, 2590, 2582, 2565, 2557, 2555, 2545, 2535, 2525, 2513, 2480, 2475?, 2433, 2420, 2398 (tension), 2369.5, 2177, 2105, 2014, 1983, 1720, 1680, 1658, 1650 (tension).	
04:57	05:55	POOH to 227.8m,	
05:55	05:58	Awaiting radio clearance for explosives.	
05:58	06:24	Continue POOH, and samples brought to the surface	

HOLE PROBLEMS

There were no hole problems encountered. The hole was in good shape, except for a few places in the Volcanics where it was washed out.

COMMENTS

Run 1: TLD-HGNS-HNGS Run went well

Run 2: HALS-HGNS-DSI-LEHQT Run went well

Run 3: MDT-GR-LEHQT (for pressures) 17 pre-tests, 9 dry, 2 lost seal, 5good, 1 tight. Communication lost with probe while running into the hole, pulled out of the hole to 700m where communication was re-established. The tool was then run in to the hole, After a series of suspect dry tests (formation pressures reading negative or zero and not building up) the tool was pulled out for testing and replaced with the backup. The backup tool was run into the hole, however while running in telemetry problems were encountered each time the tool was run into the mud. The MDT run was then abandoned and we moved on to the DUAL-CSAT-VSP run. While rigging up the MDT for Run #5 an electrical leak was found in the rope socket, the cable was cut (5 metres) and shortened in an attempt to fix it. However there remained a leak in one of the conductor wires, also two cables had their shields partially cut in the connector at the cable drum. The electrical leak persisted so the tool was re-wired to use 6 wires out of the seven in the cable, this fixed the problem. While trouble shoots the tool a small screw was found to be loose in the AMS module this module contains electronics for the signal transmission to surface,

Run 4: DUAL-CSAT-VSP Run went well

Run 5: MDT-GR-LEHQT (for pressures and samples) 41 pre-tests. 13 good, 12 lost seal/supercharged, 12 tight, 8 samples taken from 4 depths 7 recovered. The strain gauge failed at test 2956m about half way through the run.
Problems occurred with the electrical connections prior to running the tool. These are outlined above under Run 3 discussion, and are probably related to the problems that occurred during that (run 3#) run.

Run 6: CST-GR Shot 60 cores shot, 54 recovered, 2 Empty, 4 miss fire

PE607397

This is an enclosure indicator page.
The enclosure PE607397 is enclosed within the container PE908923 at this location in this document.

The enclosure PE607397 has the following characteristics:

ITEM_BARCODE =	PE607397
CONTAINER_BARCODE =	PE908923
NAME =	East Pilchard-1 Field Log Print
BASIN =	GIPPSLAND
ONSHORE? =	N
DATA_TYPE =	WELL
DATA_SUB_TYPE =	WELL_LOG
DESCRIPTION =	East Pilchard-1 ELAN PLUS Petrophysical Interpretation Enclosure 1 of Appendix 2 Quantitative Formation Evaluation
REMARKS =	
DATE_WRITTEN =	
DATE_PROCESSED =	02-AUG-2001
DATE_RECEIVED =	13-FEB-2002
RECEIVED_FROM =	Esso Australia Pty Ltd
WELL_NAME =	East Pilchard-1
CONTRACTOR =	
AUTHOR =	
ORIGINATOR =	Esso Australia Resources Ltd.
TOP_DEPTH =	
BOTTOM_DEPTH =	
ROW_CREATED_BY =	DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE607398

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NAME = East Pilchard-1 Field Log Print
BASIN = GIPPSLAND
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DATA_TYPE = WELL
DATA_SUB_TYPE = WELL_LOG
DESCRIPTION = East Pilchard-1 ELAN PLUS Petrophysical Interpretation Enclosure 2 of Appendix 2: Quantitative Formation Evaluation
REMARKS =
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DATE_PROCESSED = 02-AUG-2001
DATE_RECEIVED = 13-FEB-2002
RECEIVED_FROM = Esso Australia Pty Ltd
WELL_NAME = East Pilchard-1
CONTRACTOR =
AUTHOR =
ORIGINATOR = Esso Australia Resources Ltd.
TOP_DEPTH =
BOTTOM_DEPTH =
ROW_CREATED_BY = DN07_SW

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APPENDIX 3

PALYNOLOGICAL ANALYSIS

EXXONMOBIL EXPLORTION COMPANY

Biostratigraphy and Paleoenvironments of East Pilchard-1 Well, Gippsland Basin, Australia

Thomas D. Davies

TECHNOLOGY
HYDROCARBON SYSTEMS RESOURCES
STRATIGRAPHY/BIOSTRATIGRAPHY
EMEC.31A.BIO.01
NOVEMBER 2001

UNCLASSIFIED

TECHNOLOGY

BIOSTRATIGRAPHY REPORT

908923 097

EXXONMOBIL EXPLORATION COMPANY
BIOSTRATIGRAPHY REPORT
EEC.31A.BIO.01
NOVEMBER, 2001

Biostratigraphy and Paleoenvironments of the East Pilchard-1 Well, Gippsland Basin Australia

Thomas D. Davies

EXECUTIVE SUMMARY

- Palynology and kerogen analyses of East Pilchard-1 provides: 1) age control beneath the 'Top of Latrobe' unconformity; 2) verification for positioning of the K/T boundary; 3) age control above, within and below the volcanics; 4) palynologic subdivision and biofacies of the Upper Cretaceous reservoir section; 5) age constraints for the lower marine section; 6) description of both potentially regionally correlative and local (subzonal) biostratigraphic events from the Lower Cretaceous; and 7) paleoenvironmental interpretations to better constrain sequence stratigraphic interpretations, facies models, and paleogeographic reconstructions.

- Ten biozones are identified in the studied section from 1650-3130m. Four from the Tertiary Lower N. asperus to lower part Lower L. balmei zones and six from the Upper Cretaceous T. longus to Lower T. apoxyexinus-?P. mawsonii zones.

- Similar assemblages to those identified earlier (Davies and Ioannides, 1999) in the Kipper Field are recognized here. These are the T. lilliei, N. senectus, T. apoxyexinus, Lower T. apoxyexinus, and Lower T. apoxyexinus-?P. mawsonii zones.

- Sample 1680m is in the P. asperopolus Zone. The two samples from 1938 and 2105m are in the Lower L. balmei Zone, with 2105m being in the basal part of this Zone.

- Sample 2177m is poorly preserved but the can be placed tentatively in the Maastrichtian T. longus Zone. This indicates that the Tertiary/Cretaceous boundary occurs between this sample and sample 2105m above.

- Sample 2415-20m, just above the volcanics, is confidently placed in the T. lilliei Zone. Sample 2520-25m, within the volcanic package, is placed in the T. lilliei Zone.

- The basal marine section from 2970 is assigned to the T. apoxyexinus-P. mawsonii? Zone.

- Samples with the most marine diversity occur at 2105, 3005, 3056m and are interpreted as shallow marine. Cuttings samples 2850-55, 2970-75, and SWC 2997m also contain common marine dinocysts and are interpreted as marginal marine-lagoonal.

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INTRODUCTION

At the request of Esso Australia Ltd. (Gerard O'Halloran), we examined samples from the East Pilchard-1 five Kipper Field wells, Gippsland Basin, Australia focusing on the Upper Cretaceous reservoir interval. This report presents results of biostratigraphic analyses of sidewall cores and cuttings in the interval from 1650-3130m. The stratigraphic breakdown is summarized in Table 1 on page 2 and discussed in detail in Biostratigraphic Discussion section beginning on page 3.

The purpose of the study was to:

- provide age control for the volcanics, i.e., determine the age of the section above, within and below the volcanics,
- subdivide the subvolcanic Upper Cretaceous reservoir section and related zonation to that previously described by Davies and Ioannides (1999),
- determine the age of the lower marine section,
- verify the position of the K/T flooding surface,
- provide age constraints for the Top of Latrobe section, and
- provide paleoenvironmental interpretations to better constrain sequence stratigraphic interpretations, facies models, and paleogeographic reconstructions.

The results of this study are based on analyses of palynology and kerogen slides from forty-one sidewall core and cuttings samples from 1650-3130m (Appendix A). Where possible these palynozone are defined on downhole occurrences, but they also are characterized by influxes and base occurrences, as well as trends in overall assemblage composition. Each unit is defined as the stratigraphic interval between two distinctive biostratigraphic events. The age interpretations are approximate, as little independent information has been obtained to calibrate the Gippsland spore-pollen to the standard chronostratigraphy shown on the current Global Cycle Chart of Hardenbol and other (1998).

The age and paleoenvironmental interpretations are based on comparisons with materials from Alley (1988); Askin (1990); Burger (1980, 1990); Costa and Davey (1992); Davies and Ioannides (1999); Dettman (1984); Dettman and Jarzen (1988, 1990a, 1990b); Dettman and Playford (1969); Dettman, Pocknall and others (1990); Hardenbol and others (1998); Helby and others (1987); Jell and Playford (1988); Manum and Cookson (1964); Marshall (1988), Norvick and Burger (1976); Partridge (1976); Powell (1992); Stover and Evans (1973); Stover and Partridge (1973); Williams and Bujak (1986); and Wilson (1984).

Interpretations of paleoecology were made based on observed changes in the palynology assemblages and on biofacies from kerogen slides. Appendix A, following the references, gives a sample-by-sample listing of the distribution of important species. Relative abundance abbreviations used are: EA - extremely abundant; VA - very abundant; A - abundant; C - common; F - few; R - rare; and VR - very rare. Other abbreviations used are: SP - spores and pollen, D - dinoflagellates, and A - acritarchs.

BIOSTRATIGRAPHIC ZONATION

Table 1. Biozonation and Ages for East Pilchard-1 Well, Gippsland Basin, Australia

Depth (m MD)	Palynozone	Age
1650	Undiff. Lw. N.asper.-P.asperopolus	Middle-uppermost Eocene
1680	P. asperopolus	lower Middle-up. Lower Eocene
1720		Indeterminate
1938	Lower L. balmei	Paleocene
2105	lw. Lower L. balmei	Lowermost Paleocene
2177	Prob. T. longus	Prob. Maastrichtian
2415	Lower? T. lilliei	Upper- Middle Campanian
2675	N. senectus	Middle-Lower Campanian
2805	T. apoxyexinus	Santonian
2850	Lower T. apoxyexinus	Santonian
2905		Indeterminate
2970	Lower T. apoxyexinus-P. mawsonii?	Santonian-Turonian?

BIOSTRATIGRAPHIC DISCUSSION AND ZONATION

This section describes the results of the biostratigraphic analyses and highlights those events that are potentially of local or regional correlatable value. The zones assigned in this report are correlated, where possible, to those previously developed by Davies and Ioannides (1999) for the Kipper field.

Ten biozones are identified in the studied section from 1650-3130m. Four are in the Tertiary and range from the Middle-upper part of the Lower Eocene Lower N. asperus to lower part Lower L. balmei zones. Six are from the Upper Cretaceous T. longus to Lower T. apoxyexinus-?P. mawsonii Zone. Similar assemblages to those identified earlier (Davies and Ioannides, 1999) in the Kipper Field are recognized here. These are the T. lilliei, N. senectus, T. apoxyexinus, Lower T. apoxyexinus, and Lower T. apoxyexinus-?P. mawsonii Zones.

Samples with the most marine diversity are at 2105, 3005, 3056m and are designated as shallow marine. Cuttings samples 2850-55, 2970-75, and SWC 2997m also contain common marine dinocysts and are interpreted as marginal marine-lagoonal.

The upper two samples from 1650 and 1658m are broadly assigned to the Lower N. asperus-P. asperopolus Zone. Sample 1680m is in the P. asperopolus Zone. The two samples from 1938 and 2105m are in the Lower L. balmei Zone, with 2105m being in the basal part of this Zone.

Sample 2177m is poorly preserved but the can be placed tentatively in the Maastrichtian T. longus Zone. Sample 2415-20m is clearly in the Cretaceous and is assigned to the Lower? T. lilliei Zone. Sample 2415-20m, just about the volcanics, and sample 2520-25m within the volcanic package are placed in the T. lilliei Zone.

The basal marine section from 2970 is assigned to the T. apoxyexinus-P. mawsonii? Zone.

Interval: **1650-1680 m MD**

Age: **Middle-upper part Lower Eocene**
Zonation: **Undifferentiated Lower N. asperus-P. asperopolus**

Palynology:

- The highest sample analyzed is assigned to the undifferentiated Lower N. asperus-P. asperopolus Zone.

- taxa recorded include rare *Nothofagidites* spp., *Nothofagidites* cf. *deminutus*, *Proteacidites* spp., *Triporopollenites harrisii*, *Simplicipollis meridianus* and rare fern spores (Appendix A).

- marine dinoflagellate cysts are very rare at 1650m. This sample is interpreted as marginal-shallow marine.

Interval: **1680-1720 m MD**

Age: **Basal Middle-upper part Lower Eocene**
Zonation: **P. asperopolus**

Palynology:

- sample 1680m is placed in the P. asperopolus Zone.

- taxa noted include *Proteacidites* spp., such as *Proteacidites dilwynensis* sensu Stover and Evans, 1973 and *Proteacidites asperopolus, Tiliapollenites, Triporopollenites harrisii,* rare *Nothofagidites* spp., *Anacolosidites luteoides,* and *Malvacipollis subtilis,* and rare fern spores (Appendix A).

- marine dinoflagellate cysts are very rare in this sample and it is interpreted as marginal marine.

Interval: **1720-1938 m MD**

Age and Zonation: **Indeterminate**

Palynology:

- kerogen is very sparse and no spores, pollen, or marine dinoflagellates are recovered.

Interval: **1938-2105 m MD**

Age: **Paleocene**
Zonation: **Lower L. balmei**

Palynology:

- Taxa recorded that are consistent with this zone are *Gambierina edwardsii, Proteacidites angulata, Nothofagidites* spp., *Lygistepollenites florinii* and *L.* cf. *balmei* (Appendix A).

- marine dinoflagellate cysts are not recovered in this sample.

Interval: **2105-2177 m MD**

Age: **Lower Paleocene**
Zonation: **Lower part Lower L. balmei**

Palynology:

- *Tricolpites confessus, Tetracolporites verrucosus, Gambierina edwardsii, G. rudata, Proteacidites angulata,* rare *Nothofagidites* spp., *Lygistepollenites florinii* and *L. balmei* occur in this interval (Appendix A).

- marine dinoflagellates are common in sample 2105-10m. Taxa include *Deflandrea* cf. *deliniata, D.* cf. *medcalfii, Senegalinium ?dilwynense, Cerodinium* cf. *dartmooria, C.* cf. *striatum, Oligosphaeridium complex.* This interval is interpreted as shallow marine.

Interval: **2177-2415 m MD**

Age: **Maastrichtian**
Zonation: **Probable T. longus**

Palynology:

- taxa recorded are *?Tricolpites lilliei, Tricolpites confessus, Simplicipollis meridianus, Proteacidites* cf. *angulatus, Nothofagidites* spp., *Australopollis obscurus* and *Phyllocladidites mawsonii verrucosus* (Appendix A). Species are relatively rare and preservation is poor.

- only very rare marine dinoflagellate fragments are recovered in SWC sample 2177m. This interval is interpreted as marginal?-nonmarine.

Interval: **2415-2675 m MD**

Age: **Upper-Middle Campanian**
Zonation: **Lower? T. lilliei**

Interval age and zones:

2415m - occurrences of *Tricolpites* spp. and *Aequitriradites* spp.
2647m - presence of *Nothofagidites* spp. and *Tricolpites confessus*
2654m - presence of *Nothofagidites* spp.and *N. senectus*

Palynology:

- taxa recovered in this interval include *Aequitriradites* spp., *Tricolpites* spp., such as *Tricolpites lilliei, T. longus, T. confessus, T. waiparaensis, T. apoxyexinus, T. stipulatus/sabulosa, T. confessus* and *T. remarkensis, Gephyrapollenites wahooensis, Proteacidites* spp., *Nothofagidites senectus, Gambierina edwardsii* and *G. rudata,* and cf. *Phimopollenites pannosus* (Appendix A).

- a single marine dinoflagellate fragment is recovered in sample 2415-20m. All other samples in this section contain no marine palynomorphs and are interpreted as nonmarine.

- a similar assemblage was recorded in Kipper-1 in the sample from 2005-2110m and in Kipper-2 at 2216.18m, just beneath the volcanics (Davies and Ioannides, 1999).

Interval: **2675-2805 m MD**

Age: **Middle-Lower Campanian**
Zonation: **N. senectus**

Interval age and zones:

Palynology:

- taxa present that indicate a N. senectus Zonation include *Phimopollenites pannosus,* frequent *Proteacidites* spp., few-rare *Nothofagidites senectus, Tricolpites* spp., including *T. waiparaensis, T. gillii, T. apoxyexinus, T. stipulatus/sabulosa* and *T. confessus* (Appendix A).

- it is possible that this zone may occur slightly higher at 2620-25m.

- no marine dinoflagellates are recovered in any of the samples in this zone (Appendix A).

- a similar assemblage was recorded in Kipper-1 in the sample from 2135-2155m and in Kipper-2 at 2339.48m (Davies and Ioannides, 1999).

Interval: **2805-2850 m MD**

Age: **Santonian**
Zonation: **T. apoxyexinus**

Palynology:

- there are occurrences of *Tricolpites* spp., including *T. confessus, T. stipulatus,* and *T. cf. sabulosus,* and *Phimopollenites pannosus.*

- marine dinoflagellate cysts are not recovered in the two samples from this zone (Appendix A).

- the spore-pollen assemblage here is most similar to that first recovered in Kipper-1 at 2187.5m and in Kipper-2 in the cuttings sample at 2390m (Davies and Ioannides, 1999).

Interval: **2850-2905 m MD**

Age: **Santonian**
Zonation: **Lower T. apoxyexinus**

Palynology:

- taxa recovered include *Phimopollenites pannosus, Tricolpites confessus, T. stipulatus/sabulosus, Chatangiella victoriensis,* and *Aequitriradites* spp.(Appendix A). Preservation is poor to very poor in all of the samples from this zone.

- marine dinoflagellates cysts are common in the cuttings sample at 2850-55m. This sample contains a nearly monospecific assemblage of *Chatangiella victoriensis.* The paleoenvironment is interpreted as marginal marine. SWC sample 2857m contain very rare. poorly preserved dinocysts. The other two samples in this interval contain no marine palynomorphs and are interpreted as nonmarine.

- a similar assemblage was recorded in Kipper-1 in the sample from 2196.5m and in Kipper-2 at 2437.92m (Davies and Ioannides, 1999).

Interval: **2905-2970 m MD**

Age and Zonation: **Indeterminate**

Palynology:

- microfossils are sparse and preservation is very poor in this interval. No age diagnostic taxa are observed

Interval: **2970-3127 m MD**

Age: **Santonian-Turonian**
Zonation: **Lower T. apoxyexinus-?P. mawsonii**

Palynology:

- palynomorphs recovered in this interval include *Chatangiella victoriensis, C. porosa, Trythyrodinium suspectum, cf. Heterosphaeridium difficile, Aequitriradites spp.; Tricolpites* cf. *confessus, T.* cf. *stipulatus/sabulosus, T. cf. apoxyexinus,* and *Phimopollenites pannosus.*

- marine dinoflagellates cysts are frequent to common in all samples from this interval, except for SWC sample 3087m, which is from the basal sandstone section. This depositional environment for this interval is interpreted as marginal to shallow marine.

- a similar assemblage was recorded in Kipper-2 at 2491.00m (Davies and Ioannides, 1999).

Interval: 3127-3130m m MD

Age and Zonation: Indeterminate

Palynology:

- kerogen is mainly dark coaly. Microfossils are very sparse to barren and preservation is very poor. No age diagnostic taxa are observed (Appendix A)

Paleoenvironmental Summary

Listed below is the paleoenvironmental summary.

Depth	Environment
1650-1658m	Marginal marine
1658-1680m	Probably Nonmarine
1680-1720	Marginal marine
1720-2105	Nonmarine
2105-2177	Shallow marine
2177-2520	Marginal-nonmarine
2520-2850	Probably nonmarine
2850-2857	Marginal marine
2857-2887	Non-marginal marine
2887-2970	Probably nonmarine
2970-3005	Marginal marine
3005-3087	Shallow-marginal marine
3087-3088	Non-?marginal marine
3088-3127	Marginal marine
3127-3130	Indeterminate (no marine forms recovered)

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APPENDIX A

East Pilchard-1

SAMPLE-BY-SAMPLES LISTING OF BIOSTRATIGRAPHIC AND PALEOENVIRONMENTAL DATA

Depths in meters MD

Palynozone: Lower N. asperus-P. asperopolus undiff. (Middle-uppermost Eocene)
(1650-1680m)

1650 (SWC 60)
Paleoenvironment: Marginal marine
Kerogen: 15-20% amorph; 40-45% woody/coaly; 15-25% biodeg terr 5-10; 3-5% herbac.; 1-2% S/P
Spore/pollen (R); Dinoflagellates (VR); Pyrite (R-F); Poor preservation
Dinoflagellate unidentified (VR)
Proteacidites spp. (SP) (VR)
Proteacidites cf. reversus. (SP) (VR)
Nothofagidites spp. (SP) (VR)
Nothofagidites deminutus (SP) (VR) 93/8.9
Nothofagidites emarcidus (SP) (VR)
Nothofagidites cf. endurus (SP) (VR)
Ilexpollenites sp. (VR)
Cyathidites spp. (VR)

1658 (SWC 59)
Paleoenvironment: Nonmarine
Kerogen: 20-25% amorph; 35-40% woody/coaly; 15-25% biodeg terr 5-10%; 3-5% herbac.; 1-2% S/P; sparse
Spore/pollen (R); Dinoflagellates (barren); Pyrite (C); Very poor preservation
Nothofagidites spp. (SP) (VR)
Nothofagidites cf. deminutus (SP) (T. bellus (Mioc.)-M. diversus) (VR)
Triporopollenites harrisii (VR)
Simplicipollis meridianus (VR)
Cyathidites spp. (R)
Gleicheniidites spp. (VR)
Ischyosporites cf. gremius (VR)

Palynozone: P. asperopolus (lower part Middle Eocene-upper part Lower Eocene)
(1680-1720m)

1680 (SWC 58)
Paleoenvironment: Marginal marine
Kerogen: 10-15% amorph; 45-50% woody/coaly; 25-30% biodeg terr 5-10%; 3-5% herbac.; 1% S/P; abund.
Spore/pollen (C); Dinoflagellates (VR); Pyrite (EA); Fair-poor preservation
Dinoflagellate unidentified (VR)
Cleistosphaeridium spp.(VR)
Proteacidites spp. (SP) (C)
Proteacidites dilwyensis sensu S&E, 1973 (SP) (VR)
Proteacidites pachypolus (SP (R-F)
Proteacidites asperopolus (SP (VR)
Nothofagidites spp. (SP) (R)
Nothofagidites cf. deminutus (SP) (VR-R)
Nothofagidites emarcidus (SP) (VR)
Triporopollenites harrisii (VR) (C)
Tiliapollenites notabilis (VR)
Anacolosidites luteoides (VR)
Malvacipollis subtilis (VR)
Podocarpites spp. (VR)
Cyathidites spp. (VR)
Gleicheniidites spp. (VR)
Rugulatisporites mallatus (VR)

Palynozone: Indeterminate
(1720-1938m)

1720 (SWC 57)
Paleoenvironment: Indeterminate
Kerogen: sparse; mainly woody/coaly with some biodeg. terrest.
Spore/pollen (barren); Dinoflagellates (barren); Pyrite (R)

Palynozone: Lower L balmei (Paleocene)
(1938-2105m)

1938 (SWC 56)
Paleoenvironment: Nonmarine
Kerogen: amorph; 15-20% woody/coaly; 55-60% biodeg terr 10-15%; 3-5% herbac.; 2-5% S/P
Spore/pollen (F); Dinoflagellates (barren); Pyrite (F); Fair-poor preservation
Proteacidites spp. (SP) (R)
Proteacidites angulatus (SP) (VR)
Gambierina rudata (SP) (VR)
Gambierina edwardsii (SP) (VR)
Nothofagidites spp. (SP) (R)
Nothofagidites endurus (SP) (VR)
Lygistepollenites cf. balmei (SP) (R)
Lygistepollenites florinii (SP) (VR)
Phyllocladidites spp. (SP) (VR)
Phyllocladidites mawsonii (SP) (VR)

Palynozone: Basal Lower L balmei (Basal Paleocene)
(2105-2177m)

2105 (SWC 54)
Paleoenvironment: Shallow marine
Kerogen: amorph; 10-20% woody/coaly; 55-65% biodeg terr 10-15; 3-5% herbac.; 1-2% S/P
Spore/pollen (C); Dinoflagellates (A); Pyrite (C); Fair-poor preservation
Dinoflagellate unidentified (F)
Glaphyrocysta cf. retiintexta (VR)
Peridiniod dinoflagellates (A, broken)
Deflandrea cf. deliniata (L) (F)
Deglandrea cf. medcalfii (R)
Senegalinium ?dilwynense (Paleocene) (R)
Cerodinium cf. dartmooria (VR)
Cerodinium cf. striatum (Paleocene, L.balmei) (VR)
Oligosphaeridium complex (R)
cf. Hystrichosphaeridium tubiferum brevispinosum (VR)
Proteacidites spp. (SP) (R)
Proteacidites angulatus (SP) (R)
Gambierina rudata (SP) (VR)
Gambierina edwardsii (SP) (R)
Nothofagidites spp. (SP) (R)
Nothofagidites endurus (SP) (VR)
?Quadraplanus brossus (SP) (VR, reworked?)
Tricolpites confessus (SP) (VR-R)
Tricolpites gillii (SP) (R)
Tetracolporites verrucosus
Australopollis obscurus ((R)
Podocarpites spp. (VR)
Lygistepollenites balmei (SP) (R)
Lygistepollenites florinii (SP) (VR)
Phyllocladidites spp. (SP) (R)
Phyllocladidites mawsonii (SP) (R)
Phyllocladidites microsaccatus (SP) (R)
Stereisporites antiquasporites (SP (R)
Stereisporites (Tripunctisporis) sp. (SP) (R)
Cyathidites spp. (VR)
Gleicheniidites spp. (VR)
Ischyosporites spp.(VR)

Palynozone: prob. T. longus (Maastrichtian)
(2177-2415m)

2177 (SWC 53)
Paleoenvironment: Prob. marginal-nonmarine
Kerogen: amorph; 10-20% woody/coaly; 60-70% biodeg terr 5-10; 1-2% herbac.; <1% S/P
Spore/pollen (R-F); Dinoflagellates (ER); Pyrite (C); Poor preservation
Dinoflagellate unidentified (ER, piece), s104/11
Proteacidites spp. (SP) (R-F)
Proteacidites cf. angulatus (SP)(VR)
Nothofagidites spp. (SP) (VR)
Nothofagidites cf. senectus (SP) (VR)

Simplicipollis meridianus (VR) (R-F)
Tricolpites confessus (SP) (R)
?Tricolporites lilliei (SP) (VR)
Australopollis obscurus (VR)
Podocarpites spp. (VR)
Phyllocladidites mawsonii verrucosus (SP) (R)

Palynozone: Lower? T. lilliei (basal Maastrichtian-Campanian)
(2415-m)

2415-20 Paleoenvironment: Non-marginal marine
Kerogen: amorph; 10-20% woody/coaly; 60-70% biodeg terr 5-10; 1-2% herbac.; 2-3% S/P
Spore/pollen (R-F); Dinoflagellates (ER); Pyrite (C); Poor preservation
Dinoflagellate unidentified (ER, piece)
Proteacidites spp. (SP) (R-F)
Proteacidites cf. angulatus (SP) (VR)
Proteacidites cf. reticulconcavus (SP) (VR)
Nothofagidites spp. (SP) (R)
Nothofagidites cf. senectus (SP) (VR)
Tricolpites confessus (SP) (R)
Tricolpites gillii (SP) (R)
Tricolpites waiparaensis (SP) (VR)
Tricolpites longus (SP) (R) 105/15.2
Tricolporites lilliei (SP) (VR) 89.5/18.2
Gephyrapollenites wahooensis (SP) (VR) -104.9/14.3
Podocarpites spp. (VR)
Lygistepollenites florinii (SP) (R)
Phyllocladidites spp. (SP) (F)
Phyllocladidites mawsonii (SP) (F)
Phyllocladidites mawsonii verrucosus (SP) (R)
Phyllocladidites microsaccatus (SP) (R)
Stereisporites antiquasporites (SP) (R)
Stereisporites regium (SP) (R)
?Stereisporites viriosus (SP) (VR)
Cyathidites spp. (VR)
Gleicheniidites spp. (VR)
Aequitriradites sp. (SP) (VR) 98/5.8

2520-25 (inter volc.) Paleoenvironment: Prob. nonmarine
Kerogen: amorph; 5-10% woody/coaly; 60-75% biodeg terr 5-10; 1-2% herbac.; 2-3% S/P
Spore/pollen (C); Dinoflagellates (barren); Pyrite (F-R); fair preservation
Proteacidites spp. (SP) (R-F)
Proteacidites angulatus (SP) (VR)
Proteacidites amolosexinus (SP) (VR)
Gambierina rudata (SP) (VR)
Gambierina edwardsii (SP) (R)
Nothofagidites spp. (SP) (R)
Nothofagidites cf. senectus (SP) (VR)
Tricolpites confessus (SP) (R-F)
Tricolpites gillii (SP) (VR)
Tricolpites cf. sabulosus (SP) (VR)
Tricolpites remarkensis (SP) (R)
Tricolpites apoxyexinus (SP) (VR, top)
cf. Australopollis obscurus (VR)
cf. Gephyrapollenites wahooensis (SP) (VR)
Podocarpites spp. (R)
?Lygistepollenites balmei (SP) (VR)
Phyllocladidites spp. (SP) (F)
Phyllocladidites mawsonii (SP) (VR)
Phyllocladidites mawsonii verrucosus (SP) (VR)
Phyllocladidites microsaccatus (SP) (R-F)
Araucariacites australis (R)
Stereisporites regium (SP) (R)
Cyathidites spp. (VR)
Gleicheniidites spp. (R)
Ischyosporites spp. (VR)
Lycopodiumsporites spp. (R)
Aequitriradites sp. (SP) (F) +96/21; 106.8/20.8; 92.9/17
Aequitriradites spinosus (SP) (R) +105.8/15.5
Aequitriradites verrucosus (SP) (VR)
Triporoletes reticulatus (Rouseisporites sp.) (R)

Zlivisporis blanensis (R) 101.5/18
Laeivigatosporites spp. (F)

2613 (SWC 36)
Paleoenvironment: Prob. nonmarine
Kerogen: sparse; 25-30% amorph; 50% woody/coaly; 20% biodeg terr; % herbac.; % S/P
Spore/pollen (R); Dinoflagellates (barren); Pyrite (F-R); poor preservation
Nothofagidites spp. (SP) (VR)
Phyllocladidites spp. (SP) (R)
Stereisporites antiquasporites (SP) (VR)

2620-25
Paleoenvironment: Prob. nonmarine
Kerogen: 5-10% amorph; 50-60% woody/coaly; 15-20% biodeg terr; % herbac.; 3-5% S/P
Spore/pollen (C); Dinoflagellates (barren); Pyrite (F-R); fair-poor preservation
Proteacidites spp. (SP) (R)
Proteacidites cf. angulatus (SP) (VR)
Nothofagidites spp. (SP) (R)
Nothofagidites senectus (SP) (R-)
Tricolpites confessus (SP) (R)
Tricolpites gillii (SP) (VR)
Tricolpites cf. longus (SP) (R)
Tricolpites apoxyexinus (SP) (R-F, incr)
Australopollis obscurus (VR)
Podocarpites spp. (F)
Lygistepollenites cf. balmei (SP) (VR)
Lygistepollenites florinii (SP) (VR)
Phyllocladidites spp. (SP) (C)
Phyllocladidites mawsonii (SP) (F)
Phyllocladidites microsaccatus (SP) (C)
Araucariacites australis (R)
Cyathidites spp. (F-R)
Gleicheniidites spp. (R)
Aequitriradites sp. A (SP) (R)
Aequitriradites verrucosus (SP) (R)
Laeivigatosporites spp. (R)

2647 (SWC 35)
Paleoenvironment: Prob. nonmarine
Kerogen: 5-10% amorph; 50-60% woody/coaly; 20-25% biodeg terr; 5% herbac.; 1-2% S/P
Spore/pollen (C); Dinoflagellates (barren); Pyrite (C-A); poor- preservation
Proteacidites spp. (SP) (R-F)
Proteacidites cf. scaboratus (SP) (VR)
Nothofagidites spp. (SP) (VR)
Nothofagidites cf. senectus (SP) (VR)
Nothofagidites cf. kaitangataensis-type (SP) (VR) -97.2/21
Tricolpites confessus (SP) (VR)
Tricolpites cf. sabulosus (SP) (VR)
Podocarpites spp. (R)
Phyllocladidites spp. (SP) (F)
Phyllocladidites cf. mawsonii (SP) (VR)
Phyllocladidites microsaccatus (SP) (R)
Araucariacites australis (R-F)
Cyathidites spp. (VR)
?Aequitriradites verrucosus (SP) (R)
cf. Foraminispora wonthagiensis (SP) (VR)
Circaticosisporites cf. cuniformis (SP) (VR)
Circaticosisporites cf. australiensis (SP) (VR)

2645-2650
Paleoenvironment: Prob. nonmarine
Kerogen: 5-8% amorph; 60-65% woody/coaly; 15-20% biodeg terr; 5% herbac.; 3-5% S/P
Spore/pollen (C); Dinoflagellates (barren); Pyrite (R); fair preservation
Proteacidites spp. (SP) (R-F)
Proteacidites amolosexinus (SP) (VR)
Nothofagidites spp. (SP) (R-F, caved?)
Nothofagidites senectus (SP) (R)
Nothofagidites endurus (SP) (VR, caved?)
Tricolpites confessus (SP) (VR)
Tricolpites sabulosus (SP) (R-F)
Tricolpites cf. remarkensis (SP) (R, caved?)
Podocarpites spp. (R-F)
Phyllocladidites spp. (SP) (F)
Phyllocladidites mawsonii (SP) (R, caved?)
Phyllocladidites microsaccatus (SP) (R)
Phyllocladidites antarcticus (SP) (R)

Araucariacites australis (R)
Cyathidites spp. (R-F)
Gleicheniidites spp. (R)
Lycopodiumsporites spp. (VR)
Lycopodiacidites asperatus (SP)(VR)
Foraminispora asymmetricus (SP) (R) +97.8/17.7; 96/17
Circaticosisporites cf. australis (SP) (VR)
Circaticosisporites cf. australis (SP) (VR)
Laeivigatosporites spp. (R)

2654 (SWC 34)
Paleoenvironment: Prob. nonmarine
Kerogen: 45-55% amorph; 15-20% woody/coaly; 15-20% biodeg terr; 3-5% herbac.; 3-5% S/P
Spore/pollen (C, com mud contam.); Dinoflagellates (barren); Pyrite (F-C); poor-fair preservation
Proteacidites spp. (SP) (F-C)
Proteacidites cf. angulatus (SP) (VR)
Gambierina rudata (SP) (VR)
Nothofagidites spp. (SP) (F-C, contam?)
Nothofagidites senectus (SP) (R)
Nothofagidites cf. aperus-type (SP) (VR, contam.?)
Tricolpites confessus (SP) (VR)
cf. Tricolpites gillii (SP) (VR)
Tricolpites waiparaensis (SP) (VR)
cf. Phimopollenites pannosus (SP)) (VR-R)
Podocarpites spp. (R-F)
Phyllocladidites spp. (SP) (F)
Phyllocladidites microsaccatus (SP) (F)
Phyllocladidites antarcticus (SP) (R)
Araucariacites australis (R)
Gleicheniidites spp. (R)
Aequitriradites sp. (SP) (R-F)
Aequitriradites spinosus (SP) (R)
Aequitriradites verrucosus (SP) (R) +106.9/21
cf. Ceratosporites equalis (SP) (VR)

Palynozone: N. senectus (Middle-Lower Campanian)
(2675-2805m)

2675 (SWC 33)
Paleoenvironment: Prob. nonmarine
Kerogen: 5% amorph; 65-70% woody/coaly; 15-20% biodeg terr; 3-5% herbac.; 2-3% S/P
Spore/pollen (C, com mud contam.); Dinoflagellates (barren); Pyrite (F-R); poor-fair preservation
Proteacidites spp. (SP) (F, incr.)
Nothofagidites spp. (SP) (F, mud contam?)
Nothofagidites senectus (SP) (R)
Nothofagidites endurus (SP) (VR, mud contam.?)
Tricolpites confessus (SP) (VR)
Tricolpites gillii (SP) (VR)
Tricolpites waiparaensis (SP) (VR)
Tricolpites cf. remarkensis (SP) (R, caved?)
Tricolpites apoxyexinus (SP) (R)
Tricolpites sabulosus (SP) (R)
Phimopollenites pannosus (SP) (R)
Retimonocolpites sp. (SP (VR)
Podocarpites spp. (R-F)
Phyllocladidites spp. (SP) (F-C)
Phyllocladidites mawsonii (SP) (R)
Phyllocladidites microsaccatus (SP) (C)
Phyllocladidites antarcticus (SP) (R-F)
Araucariacites australis (R-F)
Classopollis spp. (SP)) (VR, reworked)
Cyathidites spp. (R-F)
Gleicheniidites spp. (R)
Lycopodiumsporites spp. (VR)
Aequitriradites verrucosus (SP) (VR) +106.9/21
cf. Foraminispora asymmetricus (SP) (VR, reworked)
Kraeuselisporites spp. (SP) (VR, reworked) +
Circaticosisporites spp. (SP) (VR)
cf. Ceratosporites equalis (SP) (VR)

2690 (SWC 32)
Paleoenvironment: Prob. nonmarine
Kerogen: 10-15% amorph; 45-50% woody/coaly; 25-30% biodeg terr; 5-10% herbac.; 2-3% S/P
Spore/pollen (C, com mud contam.); Dinoflagellates (barren); Pyrite (C); fair-poor preservation

Proteacidites spp. (SP) (F)
Nothofagidites spp. (SP) (F, mud contam?)
Nothofagidites senectus (SP) (R)
Nothofagidites cf. aperus-type (SP) (VR, mud contam.?)
Tricolpites sabulosus (SP) (R)
Tricolpites cf. remarkensis (SP) (R, caved?)
Phimopollenites pannosus (SP)) (R-F)
Podocarpites spp. (C)
Phyllocladidites spp. (SP) (F)
Phyllocladidites microsaccatus (SP) (A)
Phyllocladidites antarcticus (SP) (R-)
Araucariacites australis (C)
cf. Callialasporites dampieri (SP) (VR)
Cyathidites spp. (R)
Gleicheniidites spp. (R)
Triporoletes lavigatus (Rouseisporites sp.) (~Cenom. and lower) (VR) +94.5/20.9
cf. Cybelosporites striatus (SP) (R)

2698 (SWC 31)
Paleoenvironment: Prob. nonmarine
Kerogen: 15-20% amorph; 45-50% woody/coaly; 10-20% biodeg terr; 5-10% herbac.; 1-2% S/P
Spore/pollen (F-C, com mud contam.); Dinoflagellates (barren); Pyrite (C-A); poor preservation
Proteacidites spp. (SP) (F)
Nothofagidites spp. (SP) (R, mud contam?)
Tricolpites sabulosus (SP) (R)
cf. Phimopollenites pannosus (SP) (R)
Phyllocladidites spp. (SP) (F)
Phyllocladidites microsaccatus (SP) (F)
Araucariacites australis (R)
Gleicheniidites spp. (R)
Laeivigatosporites spp. (R-F)

2730-35
Paleoenvironment: Prob. nonmarine
Kerogen: 5% amorph; 65-70% woody/coaly; 10-15% biodeg terr; 5-10% herbac.; 2-3% S/P
Spore/pollen (C, com mud contam.); Dinoflagellates (barren); Pyrite (R); poor-fair preservation
Proteacidites spp. (SP) (F)
Nothofagidites spp. (SP) (R, mud contam?)
Nothofagidites senectus (SP) (R)
Tricolpites cf. confessus (SP) (VR)
Tricolpites cf. gillii (SP) (VR)
Tricolpites waiparaensis (SP) (VR)
Tricolpites sabulosus (SP) (R-F)
cf. Phimopollenites pannosus (SP) (R)
Podocarpites spp. (F-C)
Phyllocladidites spp. (SP) (C)
Phyllocladidites mawsonii (SP) (R)
Phyllocladidites microsaccatus (SP) (C)
Phyllocladidites antarcticus (SP) (R-F)
Araucariacites australis (R)
Cyathidites spp. (R)
Gleicheniidites spp. (R)
Lycopodiumsporites spp. (VR)
Triporoletes lavigatus (Rouseisporites sp.) (VR, reworked) +92.5/16
Laeivigatosporites spp. (F)

2747 (SWC 29)
Paleoenvironment: Prob. nonmarine
Kerogen: 5% amorph; 65-70% woody/coaly; 5-10% biodeg terr; 10-15% herbac.; 1-2% S/P
Spore/pollen (A, com mud contam.?); Dinoflagellates (barren); Pyrite (R); fair preservation
Proteacidites spp. (SP) (F)
Gambierina cf. edwardsii (SP) (VR, mud contam.?)
Nothofagidites spp. (SP) (R, mud contam?)
Nothofagidites senectus (SP) (R)
cf. Ilexpollenites sp. (VR)
cf. Tricolpites cf. confessus (SP) (VR)
Tricolpites sabulosus (SP) (R)
Phimopollenites pannosus (SP) (R)
Australopollis obscurus (VR)
Retimonocolpites peroreticulatus (SP (VR)
Liliacidites lanceolatus-type (SP) (R), mud contam.)
Podocarpites spp. (F-C)
Phyllocladidites spp. (SP) (C-A)
Phyllocladidites mawsonii (SP) (R-F)
Phyllocladidites microsaccatus (SP) (C-A)

Phyllocladidites antarcticus (SP) (R-F)
Araucariacites australis (F)
Cyathidites spp. (R)
Gleicheniidites spp. (R)
Aequitriradites spinosus (SP) (R)
Aequitriradites verrucosus (SP) (R) +
Laeivigatosporites spp. (F)

2761 (SWC 28)
Paleoenvironment: Prob. nonmarine
Kerogen: 5% amorph; 70-75% woody/coaly; 5-10% biodeg terr; 5-10% herbac.; 1-2% S/P
Spore/pollen (C, com mud contam.); Dinoflagellates (barren); Pyrite (F); poor-fair preservation
Proteacidites spp. (SP) (R-)
Proteacidites amolosexinus (SP) (VR)
Nothofagidites spp. (SP) (R, mud contam?)
Nothofagidites senectus (SP) (R)
Nothofagidites cf. kaitangataensis-type (SP) (VR)
Tricolpites sabulosus (SP) (R)
Tetracolporites verrucosus (VR, mud contam.?)
Podocarpites spp. (R)
Phyllocladidites spp. (SP) (F)
Phyllocladidites mawsonii (SP) (R-F)
Phyllocladidites microsaccatus (SP) (F)
Phyllocladidites antarcticus (SP) (R)
Laeivigatosporites spp. (F)

2771 (SWC 27)
Paleoenvironment: Prob. nonmarine
Kerogen: 5-10% amorph; 60-65% woody/coaly; 10-15% biodeg terr; 5-10% herbac.; 2-3% S/P
Spore/pollen (C-A, com mud contam.); Dinoflagellates (barren); Pyrite (F); fair preservation
Proteacidites spp. (SP) (F)
Nothofagidites spp. (SP) (VR, mud contam?)
Tricolpites. confessus (SP) (VR)
Tricolpites sabulosus/stipulatus (SP) (-T.apo.)) (R)
Phimopollenites pannosus (SP) (VR)
Liliacidites spp. (SP) (R-F, mud contam.)
Liliacidites lanceolatus-type (SP) (R), mud contam.) -105.6/11.1; 97.5/7.8
Podocarpites spp. (R)
Phyllocladidites spp. (SP) (C)
Phyllocladidites mawsonii (SP) (F)
Phyllocladidites microsaccatus (SP) (C)
Phyllocladidites antarcticus (SP) (F)
Araucariacites australis (R-F)
Cyathidites spp. (R)
Gleicheniidites spp. (R)
Laeivigatosporites spp. (F)

Palynozone: T. apoxyexinus (Santonian)
(2805-2850m)

2805-10
Paleoenvironment: Prob. nonmarine
Kerogen: 3-5% amorph; 65-75% woody/coaly; 5-10% biodeg terr; 10-15% herbac.; 1-2% S/P
Spore/pollen (C-A, com mud contam.); Dinoflagellates (barren); Pyrite (F); fair preservation
Proteacidites spp. (SP) (F)
Proteacidites cf. angulatus (SP) (VR), contam.)
Beaupreadites sp. (SP (VR) -106.8/8.8
Nothofagidites spp. (SP) (VR, mud contam?)
Tricolpites. confessus (SP) (VR)
Tricolpites waiparaensis (SP) (VR)
Tricolpites sabulosus/stipulatus (SP) (R-F, incr.)
Liliacidites spp. (SP) (R, mud contam.)
Liliacidites lanceolatus-type (SP) (R), mud contam.) -100.10.8
Podocarpites spp. (F)
Phyllocladidites spp. (SP) (C)
Phyllocladidites mawsonii (SP) (F-R)
Phyllocladidites microsaccatus (SP) (F-C)
Phyllocladidites antarcticus (SP) (F)
Araucariacites australis (F)
Cyathidites spp. (F-C)
Gleicheniidites spp. (F)
Clavifera triplex (SP) (VR)
Circaticosisporites cf.. australiensis (SP) (VR)
Circaticosisporites cf.. ludbrookii (SP) (VR)

Laeivigatosporites spp. (F)

2821 (SWC 24)
Paleoenvironment: Prob. nonmarine
Kerogen: 2-3% amorph; 65-70% woody/coaly; 5-8% biodeg terr; 15-20% herbac.; 2-3% S/P
Spore/pollen (F, ? mud contam.); Dinoflagellates (barren); Pyrite (R); v. poor preservation
Tricolpites cf. sabulosus/stipulatus (SP) (VR)
Phimopollenites pannosus (SP) (VR)
Podocarpites spp. (F)
Phyllocladidites spp. (SP) (C)
Phyllocladidites microsaccatus (SP) (F-C)
Araucariacites australis (R)
Stereisporites antiquasporites (SP) (VR)
Cyathidites spp. (F)
Gleicheniidites spp. (R)
Laeivigatosporites spp. (F)

Palynozone: Lower T. apoxyexinus (Santonian)
(2850-2905m)

2850-55
Paleoenvironment: Shallow-marginal marine
Kerogen: 3-5% amorph; 65-70% woody/coaly; 5-10% biodeg terr; 10-15% herbac.; 2-3% S/P
Spore/pollen (C ? mud contam.); Dinoflagellates (F-C); Pyrite (R); poor-fairpreservation
Dinoflagellate unidentified (VR) +89\14.5
Chatangiella spp. (D) (F-C)
Chatangiella victoriensis (D) (F-) +100/14.4 ;103.21
cf. Trythyrodinium suspectum (D) (R-F)
Proteacidites spp. (SP) (F, some caved?)
Proteacidites sp. Eocene (SP) (VR, contam.)
Phimopollenites pannosus (SP) (F-R, incr.)
Podocarpites spp. (F-C)
Phyllocladidites spp. (SP) (C)
Phyllocladidites microsaccatus (SP) (F-C)
Phyllocladidites antarcticus (SP) (F)
Araucariacites australis (R-F)
Cyathidites spp. (F)
Gleicheniidites spp. (R)
Lycopodiumsporites spp. (VR)
cf. Ceratosporites equalis (SP) (VR) +102/14.3

2857 (SWC 21)
Paleoenvironment: Marginal- non marine
Kerogen: 5-10% amorph; 50-55% woody/coaly; 15-20% biodeg terr; 5-10% herbac.; 3-5% S/P
Spore/pollen (F-C, ? mud contam.); Dinoflagellates (~barrren); Pyrite (C); v. poor preservation
cf. Chatangiella victoriensis (D) (-) +
Proteacidites spp. (SP) (r)
Tricolpites confessus (SP) (VR)
Tricolpites cf. sabulosus/stipulatus (SP) (VR)
Phimopollenites pannosus (SP) (F-C) 96/7.4
Podocarpites spp. (F-C)
Phyllocladidites spp. (SP) (F)
Phyllocladidites mawsonii (SP) (R)
Phyllocladidites microsaccatus (SP) (F)
Cyathidites spp. (F-R)

2887 (SWC 19)
Paleoenvironment: Prob. nonmarine
Kerogen: 5-10% amorph; 50-55% woody/coaly; 15-20% biodeg terr; 5-10% herbac.; 5-8% S/P
Spore/pollen (C); Dinoflagellates (barren); Pyrite (C); very poor preservation
Phimopollenites pannosus (SP) (F-C, incr.)
Podocarpites spp. (F-C)
Phyllocladidites spp. (SP) (F-C)
Phyllocladidites mawsonii (SP) (F-C)
Phyllocladidites mawsonii verrucosus (SP) (VR)
Phyllocladidites microsaccatus (SP) (F)
Phyllocladidites antarcticus (SP) (R-F)
Cyathidites spp. (R)
Gleicheniidites spp. (F)

2890-95 (+SWC 18)
Paleoenvironment: Prob. nonmarine
Kerogen: 2-5% amorph; 70-75% woody/coaly; 5-10% biodeg terr; 3-5% herbac.; 3-5% S/P
Spore/pollen (F); Dinoflagellates (barren); Pyrite (R-F); very poor preservation
Phimopollenites pannosus (SP) (F)
Podocarpites spp. (R)

Phyllocladidites spp. (SP) (R-F)
Phyllocladidites microsaccatus (SP) (R)
Phyllocladidites antarcticus (SP) (R)
Stereisporites sp. (?Tripunctisporis) (SP) (VR)
Cyathidites spp. (R)
Gleicheniidites spp. (R)
Aequitriradites sp. A (SP) (VR)
Aequitriradites verrucosus (SP) (VR) +
Circaticosisporites cf.. ludbrookii (SP) (VR)
cf. Ceratosporites equalis (SP) (VR)

Palynozone: Indeterminate
(2905-2970m)

2905 (SWC 17)
Paleoenvironment: Prob. nonmarine
Kerogen: 2-5% amorph; 70-75% woody/coaly; 5-10% biodeg terr; 3-5% herbac.; 1% S/P
Spore/pollen (R); Dinoflagellates (barren); Pyrite (F); very poor preservation
Podocarpites spp. (R)
Phyllocladidites spp. (SP) (R)
Phyllocladidites microsaccatus (SP) (R)

2911 (SWC 16)
Paleoenvironment: Prob. nonmarine
Kerogen: 5-8% amorph; 70-75% woody/coaly; 5-10% biodeg terr; 3-5% herbac.; 2-3% S/P
Spore/pollen (F-R); Dinoflagellates (barren); Pyrite (C); v. poor preservation
Podocarpites spp. (R)
Phyllocladidites spp. (SP) (R)

2943 (SWC 14)
Paleoenvironment: Prob. nonmarine
Kerogen: 5-10% amorph; 50-55% woody/coaly; 15-20% biodeg terr; 5-10% herbac.; 2-3% S/P
Spore/pollen (F); Dinoflagellates (barren); Pyrite (C); v. poor preservation
Proteacidites spp. (SP) (R)
Podocarpites spp. (R)
Phyllocladidites spp. (SP) (R)
Phyllocladidites microsaccatus (SP) (R)
Cyathidites spp. (R)

Palynozone: Lower T. apoxyexinus-?P. mawsonii (Santonian-?Turonian)
(2970-3127m)

2970-75
Paleoenvironment: Shallow-marginal marine
Kerogen: 5-10% amorph; 70-75% woody/coaly; 5-10% biodeg terr; 3-5% herbac.; 1-3% S/P
Spore/pollen (F); Dinoflagellates (R-F); Pyrite (C-A); fair-poor preservation
Chatangiella victoriensis (D) (F)
cf. Xiphophoridium alatum (D) (Cam8-Al6) (VR, folded)
Podocarpites spp. (R)
Phyllocladidites spp. (SP) (R)
Phyllocladidites microsaccatus (SP) (R)
Phyllocladidites antarcticus (SP) (R)
Cyathidites spp. (R)
?Cybelosporites stylosus (SP) (VR) (Lw. Alb and lower)

2997 (SWC 11)
Paleoenvironment: Shallow-marginal marine
Kerogen: 5-10% amorph; 70-75% woody/coaly; 5-10% biodeg terr; 3-5% herbac.; 1-3% S/P
Spore/pollen (C; some mud contam.); Dinoflagellates (F); Pyrite (C-A); fair-poor preservation
Dinoflagellate unidentified (vR)
Chatangiella porosa (D) (F) +b101/14.2, 105.5/12;95.5/9.9
?Isabelidinium variabile (D) (ER)
Proteacidites spp. (SP) (F, some contam?)
Proteacidites cf. angulatus (SP) (VR), contam.)
Tricolpites cf.. confessus (SP) (VR)
Tricolpites cf. sabulosus/stipulatus (SP) (VR)
Australopollis obscurus (VR)
Podocarpites spp. (F)
Phyllocladidites spp. (SP) (F)
Phyllocladidites microsaccatus (SP) (F)
Phyllocladidites antarcticus (SP) (R)
Cyathidites spp. (R)
Circaticosisporites cf.. australiensis (SP) (VR)

3005 (SWC 10)
Paleoenvironment: Shallow-marginal marine
Kerogen: 5-10% amorph; 70-75% woody/coaly; 5-10% biodeg terr; 3-5% herbac.; 1-3% S/P

Spore/pollen (C; some mud contam.); Dinoflagellates (F); Pyrite (C-A); fair-poor preservation
Dinoflagellate unidentified (R) 1111; +a104.3/5.5
Chatangiella porosa (D) (F) +a
Chatangiella triparita (D) (VR) +a
cf. Exochosphaeridium stiolatum/Fibrocysta sp. (D) (R) +a99.1/15.2
cf. Spongodinium delitiense (D) (VR, piece)
Tricolpites cf.. confessus (SP) (VR)
Tricolpites cf. sabulosus/stipulatus (SP) (VR)
Tricolpites cf. apoxyexinus (SP) (VR, base)
cf. Phimopollenites pannosus (SP) (R)
Australopollis obscurus (VR)
Podocarpites spp. (F)
Phyllocladidites spp. (SP) (F)
Phyllocladidites microsaccatus (SP) (F)
Phyllocladidites antarcticus (SP) (R)
Stereisporites antiquasporites (SP) (VR)
Gleicheniidites spp. (R)

3015-20
Paleoenvironment: Shallow-marginal marine
Kerogen: 4-5% amorph; 70-75% woody/coaly; 5-10% biodeg terr; 3-5% herbac.; 3-5% S/P
Spore/pollen (C); Dinoflagellates (F); Pyrite (VA); poor-fair preservation
Dinoflagellate unidentified (VR)
Chatangiella porosa (D) (R-F) +a
Isabelidinium spp. (D) (VR)
Trythyrodinium suspectum (D) (VR)
Tricolpites cf. sabulosus/stipulatus (SP) (VR)
Phimopollenites pannosus (SP) (R-F)
Podocarpites spp. (F)
Phyllocladidites spp. (SP) (F)
Phyllocladidites microsaccatus (SP) (F)
Phyllocladidites antarcticus (SP) (R)
Stereisporites antiquasporites (SP) (VR)
Gleicheniidites spp. (R)
Circaticosisporites cf.. australiensis (SP) (VR)
Circaticosisporites cf.. ludbrookii (SP) (VR)

3056 (SWC 8)
Paleoenvironment: Shallow-marginal marine (possible P. mawsonii, if in place)
Kerogen: 5-10% amorph; 60-70% woody/coaly; 10-15% biodeg terr; 3-5% herbac.; 1-3% S/P
Spore/pollen (C); Dinoflagellates (F-C); Pyrite (VA); poor-fair preservation
Dinoflagellate unidentified (R) 1
Chatangiella victoriensis (D) (R-F) +
Trythyrodinium suspectum (D) (VR)
cf. Heterosphaeridium difficile (D) (F; distorted, degraded, pitted)
cf. Xenascus ceratioides (D) (VR)
Tricolpites cf. sabulosus/stipulatus (SP) (VR)
Podocarpites spp. (F-R)
Phyllocladidites spp. (SP) (F)
Phyllocladidites microsaccatus (SP) (R)
Phyllocladidites antarcticus (SP) (R)
Gleicheniidites spp. (R)
Aequitriradites sp. (SP) (VR)
Aequitriradites spinosus (SP) (VR)
Balmeisporites holodictyus (SP) (VR, reworked?) +100/9.5

3072 (SWC 7)
Paleoenvironment: Shallow-marginal marine
Kerogen: 5% amorph; 60-70% woody/coaly; 15-20% biodeg terr; 3-5% herbac.; 1-3% S/P
Spore/pollen (C); Dinoflagellates (F); Pyrite (A); poor preservation
Dinoflagellate unidentified (VR) 1
Chatangiella victoriensis (D) (Camp-Turon. (F)
Proteacidites spp. (SP) (, some contam?)
Podocarpites spp. (R)
Phyllocladidites spp. (SP) (F)
Phyllocladidites microsaccatus (SP) (R)

3087 (SWC 6)
Paleoenvironment: Non-?marginal marine
Kerogen: 5% amorph; 60-70% woody/coaly; 15-20% biodeg terr; 3-5% herbac.; 1-3% S/P
Spore/pollen (F); Dinoflagellates (~barren); Pyrite (C); poor preservation
? Trythyrodinium suspectum (D) (VR)
Podocarpites spp. (R)
Phyllocladidites spp. (SP) (F)
Phyllocladidites microsaccatus (SP) (R)
Phyllocladidites antarcticus (SP) (R)

Cyathidites spp. (R)

3088 (SWC 5)

Paleoenvironment: Marginal marine
Kerogen: 5% amorph; 60-70% woody/coaly; 15-20% biodeg terr; 3-5% herbac.; 1-3% S/P
Spore/pollen (F); Dinoflagellates (R); Pyrite (C); poor preservation
Dinoflagellate unidentified (VR) 1
Chatangiella spp. (D) (VR)
Chatangiella cf. victoriensis (D) (Camp-Turon. (VR)
Podocarpites spp. (R)
Phyllocladidites spp. (SP) (F)
Phyllocladidites microsaccatus (SP) (R)
Phyllocladidites antarcticus (SP) (R)
Cyathidites spp. (R)
Aequitriradites spinosus (SP) (VR)

3085-90

Paleoenvironment: Marginal-shallow marine
Kerogen: 5% amorph; 60-70% woody/coaly; 15-20% biodeg terr; 3-5% herbac.; 1-3% S/P
Spore/pollen (F-C, some contam.); Dinoflagellates (F); Pyrite (C-A); poor preservation
Chatangiella spp. (D) (VR)
Chatangiella victoriensis (D) (R)
Isabelidinium variabile (D) (VR)
Proteacidites spp. (SP) (F, some contam?)
Tricolpites cf. sabulosus/stipulatus (SP) (VR)
Podocarpites spp. (R)
Phyllocladidites spp. (SP) (F)
Phyllocladidites microsaccatus (SP) (F)
Phyllocladidites antarcticus (SP) (R)
Araucariacites australis (R)
Stereisporites antiquasporites (SP) (VR)
Cyathidites spp. (R)
Gleicheniidites spp. (R)
cf. Ceratosporites equalis (SP) (VR) -

Palynozone: Indeterminate
(3127-3130m)

3127 (SWC 3)

Paleoenvironment: Indeterminate
Kerogen: Dark coaly; 1-2% amorph; 80-85% coaly; 5-10% biodeg terr; <1% herbac.; <1% S/P
Spore/pollen (nearly barren); Dinoflagellates (nearly barren); Pyrite (C-A);v. poor preservation

3125-30

Paleoenvironment: Indeterminate
Kerogen: Dark coaly; 5-10% amorph; 75-80% coaly; 5-10% biodeg terr; <1% herbac.; % S/P
Spore/pollen (R, mostly caved); Dinoflagellates (nearly barren); Pyrite (VA); poor preservation
Phyllocladidites spp. (SP) (VR, caved?)
Phyllocladidites microsaccatus (SP) (VR, caved?)

APPENDIX 4

GEOCHEMISTRY

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GEOCHEMISTRY REPORT

EAST PILCHARD-1 WELL

Gippsland Basin

By
J.K. Emmett

February 2002

LIST OF TABLES AND FIGURES

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Introduction

The selection of sidewall core and cuttings sample locations for source rock geochemistry were based on electric log characteristics of the East Pilchard-1 well. A total of thirty-seven rock samples (twenty-three sidewall core and 14 cuttings) from the Latrobe and Golden Beach Groups, were analysed for Total Organic Carbon (TOC) and Rock-Eval pyrolysis by GEOTECH. Thirteen samples (five sidewall cores and eight cuttings) were analysed for vitrinite reflectance and description of maceral composition and abundance including liptinite fluorescence, by Keiraville Konsultants.
Two selected MDT gas samples were analysed for composition and compound specific carbon isotopes by AGSO-Geoscience Australia.

Results

TOC and Rock-Pyrolysis

TOC and Rock-Eval pyrolysis results are presented in Table 1. Sixteen samples with initial pyrograms that showed signs of glycol drilling fluid contamination, were subjected to a water extraction process, and reanalysed. These samples are identified by 'ext' in Table 1. For these samples, the water extraction process reduced TOC measurements by between 0% and 13%, with a mean reduction of about 6%.
Figure 1 is a 'Rock-Eval Source - Maturation plot' of HI vs Tmax. Latrobe Group and Golden Beach Group carbonaceous shales, siltstones and coals, generally show good to excellent oil and gas source potential. Samples with LowerT. Apoxyexinus - P. Mawsonii palynozone assignment, although generally having good TOC richness, generally show lower HI values than samples from younger palynozones, and would therefore rate as more gas prone. Based on Rock-Eval Tmax measurements, samples from the T. Lilliei and older palynozones are mature for effective hydrocarbon generation.

Vitrinite Reflectance and Organic Petrography

Table 2 shows the results of vitrinite reflectance measurements and brief description of maceral abundances, liptinite fluorescence and mineral fluorescence for each sample analysed.
Vitrinite reflectance is plotted with depth in Figure 2. Vitrinite reflectance steadily increases with depth with the exception of the bottom sample at 3127 metres, which has an anomalously high reflectance measurement. As noted in the analysts notes in Table 2, this sample is highly overmature due to contact alteration by an igneous intrusion, penetrated in the well approximately five metres below the depth of this sample.
The top of the effective oil generation window based on a vitrinite reflectance value of 0.65%, occurs at about 2600 metres (mdkb).
Details and histograms of vitrinite reflectance measurements for each sample are presented in Appendix 1.

Gas Composition and Carbon Isotope Analysis

Gas composition and compound specific carbon isotope analyses for MDT gas samples taken at 3103.8 m and 3122 m are shown in Tables 3.1 and 3.2 respectively. The component abundances and isotopic signature of both gases are very similar. Both samples are moderately wet gases (C2+: 11.07% and 11.41%) and have a significant amount of carbon dioxide (16.26% and 13.45%). The carbon dioxide abundance (10%-20% range) is similar to that present in other Gippsland Basin northern margin gases and interpreted to be most likely of igneous/volcanic origin based on carbon isotope values.
The level of maturity (LOM) of the East Pilchard-1 gas samples as derived from the gas maturity diagram of James, 1983 (Figure 3), is in the region of LOM 12.5-LOM 13, very similar to the nearby Kipper Gas Field gas LOM,

Reference

James, A.T., 1983 - Correlation of natural gas by use of carbon isotopic distribution between hydrocarbon components. AAPG Bulletin 67, 1,176-91.

TABLE 1

ANALYSIS OF ORGANIC MATTER BY ROCK-EVAL PYROLYSIS

EAST PILCHARD-1 Esso GEOTECH

Depth (m)	Age	Palynozone	Stratigraphy		Tmax	S1	S2	S3	S1+S2	S2/S3	PI	TOC	HI	OI
1695-1700	lower Middle-up. Lower Eocene	P. asperopolus	Latrobe Group		422	1.83	6.74	1.96	8.57	3.44	0.21	2.24	301	88
1725-1730	Indeterminate	P. asperopolus	Latrobe Group		423	1.90	7.54	1.78	9.44	4.24	0.20	2.72	277	65
1760-1765	Indeterminate		Latrobe Group		424	1.48	6.79	2.69	8.27	2.52	0.18	2.61	260	103
1760-1765	Indeterminate		Latrobe Group	ext	nd	nd	nd	nd	nd	nd	nd	2.52	nd	nd
1765-1770	Indeterminate		Latrobe Group		424	2.31	23.10	5.06	25.41	4.57	0.09	9.10	254	56
1785-1790	Indeterminate		Latrobe Group		427	1.92	13.16	2.50	15.08	5.26	0.13	4.00	329	63
1835-1840	Indeterminate		Latrobe Group		426	1.64	16.40	2.41	18.04	6.80	0.09	4.78	343	50
1950-1955	Paleocene	Lower L. balmei	Latrobe Group		427	4.48	45.05	7.70	49.53	5.85	0.09	13.74	328	56
2014.0	Paleocene	Lower L. balmei	Latrobe Group		422	4.00	109.50	13.00	113.50	8.42	0.04	67.87	161	19
2025-2030	Paleocene	Lower L. balmei	Latrobe Group		424	4.08	26.93	11.02	31.01	2.44	0.13	12.05	223	91
2155-2160	Lowemost Paleocene	lw. Lower L. balmei	Latrobe Group		428	1.47	7.33	1.83	8.80	4.01	0.17	2.67	275	69
2155-2160	Lowemost Paleocene	lw. Lower L. balmei	Latrobe Group	ext	nd	nd	nd	nd	nd	nd	nd	2.48	nd	nd
2200-2205	Prob. Maastrichtian	Prob. T. Longus	Latrobe Group		435	1.30	20.82	1.82	22.12	11.44	0.06	6.40	325	28
2360-2365	Prob. Maastrichtian	Prob. T. Longus	Golden Beach and Emperor Subgroup		431	2.23	16.15	2.29	18.38	7.05	0.12	5.52	293	41
2590.0	Upper-Middle Campanian	Lower? T. Lilliei	Golden Beach and Emperor Subgroup		432	1.09	7.73	2.52	8.82	3.07	0.12	3.19	242	79
2604.0	Upper-Middle Campanian	Lower? T. Lilliei	Golden Beach and Emperor Subgroup		449	4.28	42.85	4.28	47.13	10.01	0.09	26.63	161	16
2620.0	Upper-Middle Campanian	Lower? T. Lilliei	Golden Beach and Emperor Subgroup		438	0.68	4.45	0.76	5.13	5.86	0.13	2.81	158	27
2633.5	Upper-Middle Campanian	Lower? T. Lilliei	Golden Beach and Emperor Subgroup		437	2.13	28.47	0.95	30.60	29.97	0.07	6.42	443	15
2654.0	Upper-Middle Campanian	Lower? T. Lilliei	Golden Beach and Emperor Subgroup		437	2.44	24.26	1.90	26.70	12.77	0.09	5.24	463	36
2675.0	Middle-Lower Campanian	N. Senectus	Golden Beach and Emperor Subgroup		438	2.20	12.76	1.58	14.96	8.08	0.15	4.18	305	38
2675.0	Middle-Lower Campanian	N. Senectus	Golden Beach and Emperor Subgroup	ext	nd	nd	nd	nd	nd	nd	nd	3.97	nd	nd
2690.0	Middle-Lower Campanian	N. Senectus	Golden Beach and Emperor Subgroup		438	1.49	13.91	1.32	15.40	10.54	0.10	3.83	363	34
2747.0	Middle-Lower Campanian	N. Senectus	Golden Beach and Emperor Subgroup		437	0.58	7.46	0.95	8.04	7.85	0.07	1.83	408	52
2771.0	Middle-Lower Campanian	N. Senectus	Golden Beach and Emperor Subgroup		399	1.19	4.89	1.54	6.08	3.18	0.20	1.70	288	91
2771.0	Middle-Lower Campanian	N. Senectus	Golden Beach and Emperor Subgroup	ext	nd	nd	nd	nd	nd	nd	nd	1.63	nd	nd
2820.0	Santonian	T. apoxyexinus	Golden Beach and Emperor Subgroup		449	0.53	2.02	0.72	2.55	2.81	0.21	0.65	311	111
2820.0	Santonian	T. apoxyexinus	Golden Beach and Emperor Subgroup	ext	nd	nd	nd	nd	nd	nd	nd	0.60	nd	nd
2857.0	Santonian	Lower T. Apoxyexinus	Golden Beach and Emperor Subgroup		445	0.35	2.99	0.85	3.34	3.52	0.10	1.00	299	85
2857.0	Santonian	Lower T. Apoxyexinus	Golden Beach and Emperor Subgroup	ext	nd	nd	nd	nd	nd	nd	nd	0.91	nd	nd
2870-2875	Santonian	Lower T. Apoxyexinus	Golden Beach and Emperor Subgroup		353	0.75	3.04	2.33	3.79	1.30	0.20	1.14	267	204
2870-2875	Santonian	Lower T. Apoxyexinus	Golden Beach and Emperor Subgroup	ext	nd	nd	nd	nd	nd	nd	nd	0.99	nd	nd
2887.0	Santonian	Lower T. Apoxyexinus	Golden Beach and Emperor Subgroup		444	0.75	3.77	0.73	4.52	5.16	0.17	1.16	325	63
2887.0	Santonian	Lower T. Apoxyexinus	Golden Beach and Emperor Subgroup	ext	nd	nd	nd	nd	nd	nd	nd	1.11	nd	nd
2895.0	Santonian	Lower T. Apoxyexinus	Golden Beach and Emperor Subgroup		452	0.19	1.19	0.28	1.38	4.25	0.14	0.77	155	36
2905.0	Indeterminate		Golden Beach and Emperor Subgroup		341	0.93	2.16	0.86	3.09	2.51	0.30	1.08	200	80
2905.0	Indeterminate		Golden Beach and Emperor Subgroup	ext	nd	nd	nd	nd	nd	nd	nd	0.96	nd	nd
2943.0	Indeterminate		Golden Beach and Emperor Subgroup		431	0.35	2.77	0.75	3.12	3.69	0.11	0.89	311	84

TABLE 1

ANALYSIS OF ORGANIC MATTER BY ROCK-EVAL PYROLYSIS

EAST PILCHARD-1 Esso GEOTECH

Depth (m)	Age	Palynozone	Stratigraphy		Tmax	S1	S2	S3	S1+S2	S2/S3	PI	TOC	HI	OI
2943.0	Santonian - Turonian?	Lower T. apoxyexinus - P. mawsonii	Golden Beach and Emperor Subgroup	ext	nd	nd	nd	nd	nd	nd	nd	0.84	nd	nd
2997.0	Santonian - Turonian?	Lower T. apoxyexinus - P. mawsonii	Golden Beach and Emperor Subgroup		349	0.97	3.30	1.76	4.27	1.88	0.23	2.61	126	67
2997.0	Santonian - Turonian?	Lower T. apoxyexinus - P. mawsonii	Golden Beach and Emperor Subgroup	ext	nd	nd	nd	nd	nd	nd	nd	2.48	nd	nd
3005.0	Santonian - Turonian?	Lower T. apoxyexinus - P. mawsonii	Golden Beach and Emperor Subgroup		364	0.44	2.09	2.92	2.53	0.72	0.17	1.34	156	218
3005.0	Santonian - Turonian?	Lower T. apoxyexinus - P. mawsonii	Golden Beach and Emperor Subgroup	ext	nd	nd	nd	nd	nd	nd	nd	1.20	nd	nd
3056.0	Santonian - Turonian?	Lower T. apoxyexinus - P. mawsonii	Golden Beach and Emperor Subgroup		441	0.59	2.32	1.31	2.91	1.77	0.20	2.50	93	52
3072.0	Santonian - Turonian?	Lower T. apoxyexinus - P. mawsonii	Golden Beach and Emperor Subgroup		366	0.49	2.94	2.24	3.43	1.31	0.14	1.67	176	134
3072.0	Santonian - Turonian?	Lower T. apoxyexinus - P. mawsonii	Golden Beach and Emperor Subgroup	ext	nd	nd	nd	nd	nd	nd	nd	1.68	nd	nd
3087.0	Santonian - Turonian?	Lower T. apoxyexinus - P. mawsonii	Golden Beach and Emperor Subgroup		439	1.06	3.85	1.54	4.91	2.50	0.22	3.10	124	50
3087.0	Santonian - Turonian?	Lower T. apoxyexinus - P. mawsonii	Golden Beach and Emperor Subgroup	ext	nd	nd	nd	nd	nd	nd	nd	3.04	nd	nd
3088.0	Santonian - Turonian?	Lower T. apoxyexinus - P. mawsonii	Golden Beach and Emperor Subgroup		438	0.91	3.63	1.67	4.54	2.17	0.20	2.85	127	59
3088.0	Santonian - Turonian?	Lower T. apoxyexinus - P. mawsonii	Golden Beach and Emperor Subgroup	ext	nd	nd	nd	nd	nd	nd	nd	2.72	nd	nd
3127.0	Santonian - Turonian?	Lower T. apoxyexinus - P. mawsonii	Golden Beach and Emperor Subgroup		367	0.39	1.76	1.26	2.15	1.40	0.18	0.89	198	142
3127.0	Santonian - Turonian?	Lower T. apoxyexinus - P. mawsonii	Golden Beach and Emperor Subgroup	ext	nd	nd	nd	nd	nd	nd	nd	0.85	nd	nd

ext = water extracted sediment

A TMAX value is not reported if the S2 is <0.2mg/g

TMAX = Max. temperature S2
S1+S2 = Potential yield
OI = Oxygen Index

S1 = Volatile hydrocarbons (HC)
S3 = Organic carbon dioxide
TOC = Total organic carbon
nd = no data

S2 = HC generating potential
PI = Production Index
HI = Hydrogen Index

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Table 2

EAST PILCHARD, p 1

KK # Ref #.	Depth(m) /Type	$\overline{R}_{vmax}$	Range	N	Sample description including liptinite fluorescence, maceral abundances, mineral fluorescence
T8076 Ctgs	1715-1720 $\overline{R}_{Imax}$	0.45	0.38-0.51	25	Abundant suberinite, dull orange to weak brown, abundant cutinite, dull yellow to orange, abundant resinite, greenish yellow, abundant sporinite and common liptodetrinite, dull yellow to orange. (Coal>shaly coal>siltstone. Coal dominant , V>I>L, clarite>duroclarite>=vitrite. Coal comprises about 60% of the sample and approximate maceral composition on contaminant free basis: vitrinite 85%; inertinite 5%; liptinite 10%. Shaly coal major, V>I>L, duroclarite>vitrite. Shaly coal comprise about 30% of the sample and approximate maceral composition on contaminant free basis: vitrinite 65%; inertinite 20%; liptinite 15%. Dom sparse, L>I>V. Liptinite sparse, inertinite and vitrinite rare. Micrinite abundant in most vitrinite. Sclerotinite abundant in some coals. Mineral fluorescence moderate orange. Pyrite sparse.)
T8077 Ctgs	1835-1840 $\overline{R}_{Imax}$	0.48 1.38	0.38-0.61 0.94-2.44	25 10	Abundant sporinite and sparse liptodetrinite, dull yellow to orange, common resinite, greenish yellow, sparse cutinite, yellow, sparse suberinite, weak brown. (Sandstone>siltstone> coal>shaly coal. Coal major, I>V>L, clarodurite>duroclarite> clarite=vitrite. Coal comprises about 15% of the sample and approximate maceral composition on mineral free basis: inertinite 50%; vitrinite 30%; liptinite 20%. Shaly coal sparse, V>I>L, clarite. Dom common, L>I>V. Liptinite common, inertinite and vitrinite sparse. Some coal grains show microfolds. Yellow fluorescing oil droplets in siltstone. Micrinite abundant in some vitrinite. Mineral fluorescence moderate orange. Iron oxides rare. Pyrite common.)
T8078 Ctgs	1950-1955 $\overline{R}_{Imax}$	0.48 1.18	0.39-0.56 0.92-1.34	25 10	Abundant sporinite and common liptodetrinite, dull yellow to orange, sparse resinite, greenish yellow, sparse cutinite, yellow, sparse suberinite, weak brown. (Siltstone>sandstone> coal>shaly coal. Coal abundant, V>L>I, Vitrite>duroclarite> clarodurite>inertite. Shaly coal abundant, V>L>I, clarite> clarodurite. Dom common, L>I>V. Liptinite common, inertinite and vitrinite sparse. Micrinite abundant in some vitrinite. Some coal grains show microfolds. Mineral fluorescence moderate orange. Iron oxides rare. Pyrite abundant.)
T8079 SWC	2014 $\overline{R}_{Imax}$	0.50	0.39-0.58	25	Abundant sporinite and common liptodetrinite, dull yellow to orange, common resinite, greenish yellow, sparse cutinite, yellow, abundant suberinite, weak brown. (Coal, I>V>L, Clarodurite>duroclarite>inertite>vitrinertite(I)>vitrite. Sample consists exclusively of coal and maceral composition on mineral free basis: inertinite 60%, vitrinite 30%, liptinite 10%. Pyrite sparse.)

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Table 2

EAST PILCHARD, p 2

KK # Ref #.	Depth(m) /Type	$\bar{R}_{vmax}$	Range	N	Sample description including liptinite fluorescence, maceral abundances, mineral fluorescence
T8080	2155-2160	0.53	0.44-0.65	25	Common sporinite and sparse liptodetrinite, yellow to orange, rare cutinite, orange. (Sandstone>siltstone>coal. Coal common to abundant, V>L>I, vitrite>duroclarite. Dom sparse to common. L>I>V. Liptinite and inertinite sparse, vitrinite rare to sparse. Diffuse organic matter abundant in some siltstones. Mineral fluorescence moderate orange to none. Iron oxides rare. Pyrite sparse.)
Ctgs	$\bar{R}_{Imax}$	1.17	0.92-1.54	10	
T8081	2360-2365	0.58	0.49-0.69	25	Common sporinite and sparse liptodetrinite, yellow to orange, rare cutinite, orange, rare resinite, orange, sparse suberinite, weak brown. (Sandstone>siltstone>coal>carbonate. Coal common to abundant, V>L>I, vitrite>duroclarite>clarodurite. Dom common. L>I>V. All three maceral groups sparse. Mineral fluorescence moderate orange to none. Iron oxides rare. Pyrite sparse.)
Ctgs	$\bar{R}_{Imax}$	1.37	1.02-1.84	10	
T8082	2604	0.84	0.77-0.93	25	Common sporinite and sparse liptodetrinite, orange to dull orange, rare cutinite, dull orange, sparse resinite, orange. (Coal>shaly coal>siltstone>sandstone. Coal dominant, V, vitrite. Shaly coal major, V>L>I, vitrite>clarodurite= duroclarite. Dom abundant. V>>I>L. Vitrinite abundant, inertinite and liptinite sparse. Mineral fluorescence moderate orange to weak and none. Iron oxides rare. Pyrite sparse.)
SWC	$\bar{R}_{Imax}$	1.74	1.18-2.38	10	
T8083	2690	0.63	0.51-0.73	30	Common sporinite yellowish orange to dull orange, sparse resinite yellowish orange to dull brown, sparse cutinite yellow to dull orange, sparse liptodetrinite yellow to dull orange, suberinite, weak brown. (Claystone. Dom abundant. V>L>I. Vitrinite and liptinite abundant, inertinite sparse. Many of the vitrinite layers are derived from roots and most of the sample probably represents a soil horizon. Most of the cutinite is from root tissue, but some leaves are present. Mineral fluorescence pervasive moderate orange. Pyrite sparse.)
SWC	$\bar{R}_{Imax}$	1.22	1.04-1.36	3	
T8084	2771	0.68	0.54-0.80	25	Sparse sporinite and liptodetrinite, dull orange, rare cutinite, dull orange. (Siltstone>>coal. Coal rare, V, vitrite.. Dom abundant, I>V>L. Inertinite common, vitrinite and liptinite sparse. Sparse dull orange fluorescing bitumen. Mineral fluorescence moderate orange to weak orange. Iron oxides rare. Pyrite sparse.)
SWC	$\bar{R}_{Imax}$	1.50	1.16-1.84	10	
T8085	2870-2875	0.76	0.53-0.97	25	Fluorescing liptinite absent. (Claystone>siltstone>sandstone> carbonate>coal. Coal rare, V, vitrite. Dom common, I>>V. Inertinite common, vitrinite rare to sparse, liptinite absent. Micrinite abundant in some vitrinite. Diffuse organic matter abundant in some siltstones. Mineral fluorescence pervasive to weakly patchy, moderate to weak orange to none. Iron oxides rare. Pyrite sparse to common.)
Ctgs	$\bar{R}_{Imax}$	1.64	1.34-2.18	10	

Table 2

KK # Ref #.	Depth(m) /Type	$\overline{R}_{vmax}$	Range	N	**EAST PILCHARD, p 3** Sample description including liptinite fluorescence, maceral abundances, mineral fluorescence
T8086 SWC	2997 $\overline{R}_{Imax}$	0.93 1.25	0.76-1.03 1.05-2.10	32 21	Sparse sporinite dull orange, sparse liptodetrinite dull orange, rare cutinite dull orange to dull brown, rare ?resinite yellowish orange to dull brown. (Argillaceous siltstone. Dom abundant, I>V>L. Inertinite abundant, vitrinite and liptinite sparse. Liptinite fluorescence has largely converged with that of the minerals. Mineral fluorescence patchy, moderate orange to weak orange. Iron oxides sparse on rims of some grains, may be a contaminant. Pyrite common.)
T8087 SWC	3087 $\overline{R}_{Imax}$	0.85 1.77	0.67-1.11 1.20-2.68	25 10	Sparse sporinite and liptodetrinite, orange to dull orange,, rare cutinite, orange, rare resinite, orange (Siltstone. Dom abundant, I>V>L. Inertinite abundant, vitrinite sparse to common, liptinite sparse. Rare dull orange fluorescing bitumen. Mineral fluorescence strongly patchy strong to moderate and weak orange. Iron oxides common. Pyrite sparse.)
T8088 SWC	3127 $\overline{R}_{Imax}$	5.44	4.82-6.03	25	Fluorescing liptinite absent. (Calcareous sandstone and siltstone. Dom common, I>V. Inertinite and vitrinite sparse, liptinite absent. Mineral fluorescence none. Iron oxides rare. Pyrite sparse.)

The shallowest sample shows low maturity level and is from the Latrobe Valley facies of Smith and Cook (APEA, J, 1984). The second sample is only marginally higher in vitrinite reflectance but belongs to the Lower Eastern View B facies. The remainder of the samples are also from the Lower Eastern View facies with both the A and B variants being present. The Upper Eastern View facies does not appear to be present in this section.

The top of the oil window is reached at about 2000 m. A marked jump in vitrinite reflectance was found between 2365 m (cuttings) and 2604 m (SWC), but some of the deeper SWC samples lie below the value obtained from the SWC at 2604 m. The differences between the SWC samples appear to represent facies variations. The lower values are generally associated with root horizons and the higher values showing some evidence of reworking of the humic material. This reworking is most evident in the silty lithologies. The SWC from 2997 m contains a large population of transitional material lying between vitrinite and inertinite. An initial value of 1.04% was obtained for this sample but the identifications were revised in relation to the overlying and underlying SWC samples. It is noticeable that the mineral fluorescence of the samples from 2997 m and 3087 m suggests a higher level of maturation compared with the shallower section. The main change in the liptinite fluorescence occurs at a shallower depth with the main change being between 2690 m and 2771 m.

The deepest sample is markedly different in lithological terms with large amounts of carbonate being present. The sample is highly overmature. Little difference is present between the probable vitrinite reflectances and the inertinite values. Bireflectance of the vitrinite is low. This would be consistent with the high level of maturation being due to contact alteration. The carbonate could also be a result of contact alteration effects.
ACC Tuesday, 25 December 2001

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Table 3.1

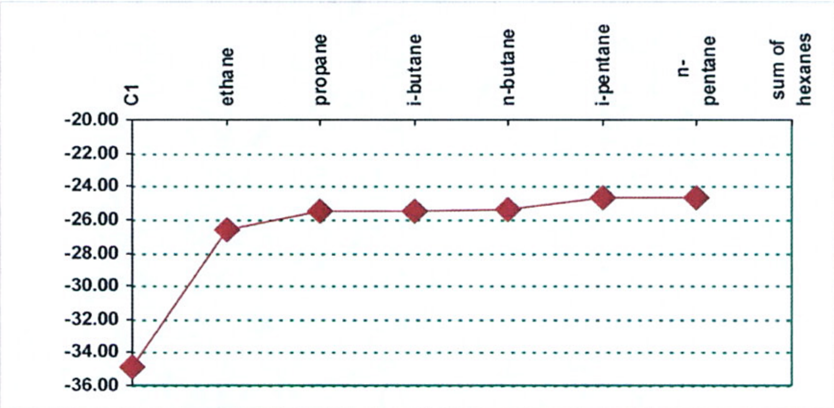
AGSO Gas Report AGSO - Geoscience Australia

AGSO GEOSCIENCE AUSTRALIA

Gas Composition and Isotope Summary Sheet

AGSO No:	20019161	*Oils of Oz No:*			
Basin:	Gippsland Basin	*Age:*	Santonian - Turonian?	*Latitude:*	
Well :	East Pilchard 1	*Depth (m) :*	3103.8 m	*Longitude:*	
Test :	Cyl. L104	*Formation :*	Golden Beach Group		

Comments : Sample provided by Petrolabs



Gas composition analysed by:

	mole %	δ 13C (permil;PDB)
Methane	75.12	-34.88 ± 0.13
Ethane	5.09	-26.59 ± 0.16
Propane	1.86	-25.50 ± 0.07
i-Butane	0.27	-25.50 ± 0.03
n-Butane	0.47	-25.41 ± 0.10
i-Pentane	0.14	-24.66 ± 0.01
n-Pentane	0.14	-24.69 ± 0.11
Hexane	0.00	±
C7+	0.48	
Nitrogen	0.16	
CO2	16.25	-4.77 ± 0.11
Helium	0.00	
Hydrogen	0.00	

Table 3.2

AGSO Gas Report AGSO - Geoscience Australia

AGSO GEOSCIENCE AUSTRALIA

Gas Composition and Isotope Summary Sheet

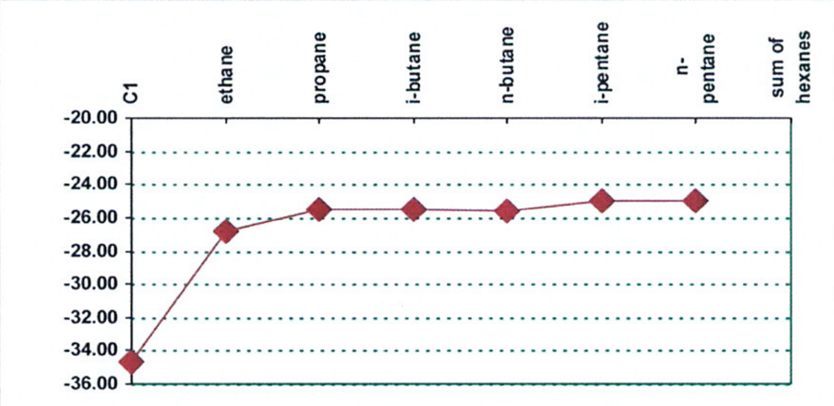
AGSO No: 20019160 *Oils of Oz No:*

Basin: Gippsland Basin *Age:* Santonian - Turonian? *Latitude:*

Well : East Pilchard 1 *Depth (m) :* 3122 m - *Longitude:*

Test : Cyl. L227 *Formation :* Golden Beach Group

Comments : Sample provided by Petrolabs



Gas composition analysed by:

	mole %	δ 13C (permil;PDB)
Methane	77.88	-34.72 ± 0.10
Ethane	5.34	-26.82 ± 0.15
Propane	1.99	-25.54 ± 0.03
i-Butane	0.28	-25.54 ± 0.09
n-Butane	0.47	-25.62 ± 0.01
i-Pentane	0.11	-25.00 ± 0.34
n-Pentane	0.10	-24.98 ± 0.47
Hexane	0.00	±
C7+	0.20	
Nitrogen	0.17	
CO2	13.45	-4.86 ± 0.17
Helium	0.00	
Hydrogen	0.00	

ROCKEVAL SOURCE - MATURATION PLOT

Well: EAST PILCHARD-1
Gippsland Basin

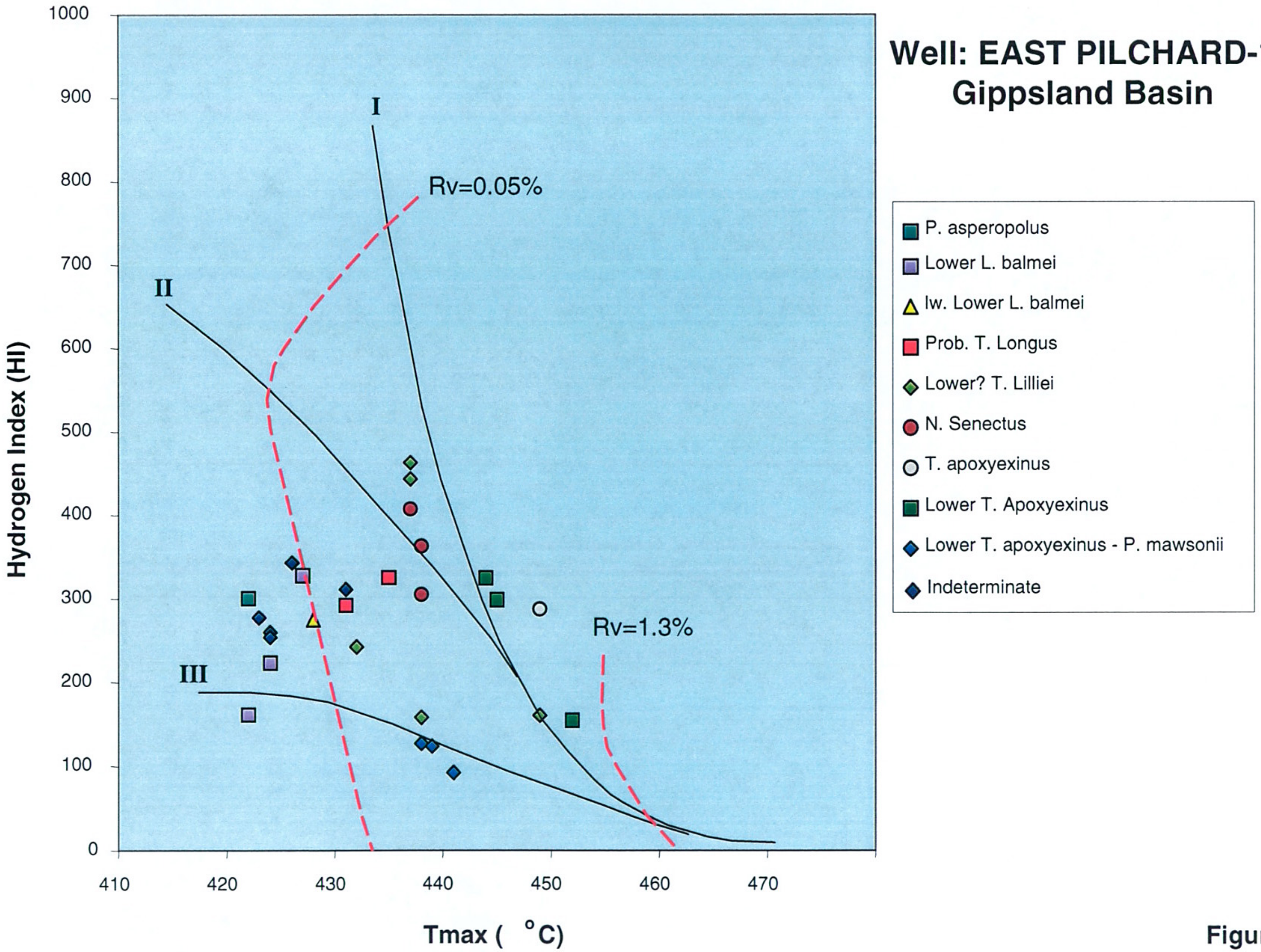


Figure 1

PE908923-color 034
908923 134

Figure 2

Vitrinite Reflectance vs Depth

Well: EAST PILCHARD-1

Gippsland Basin

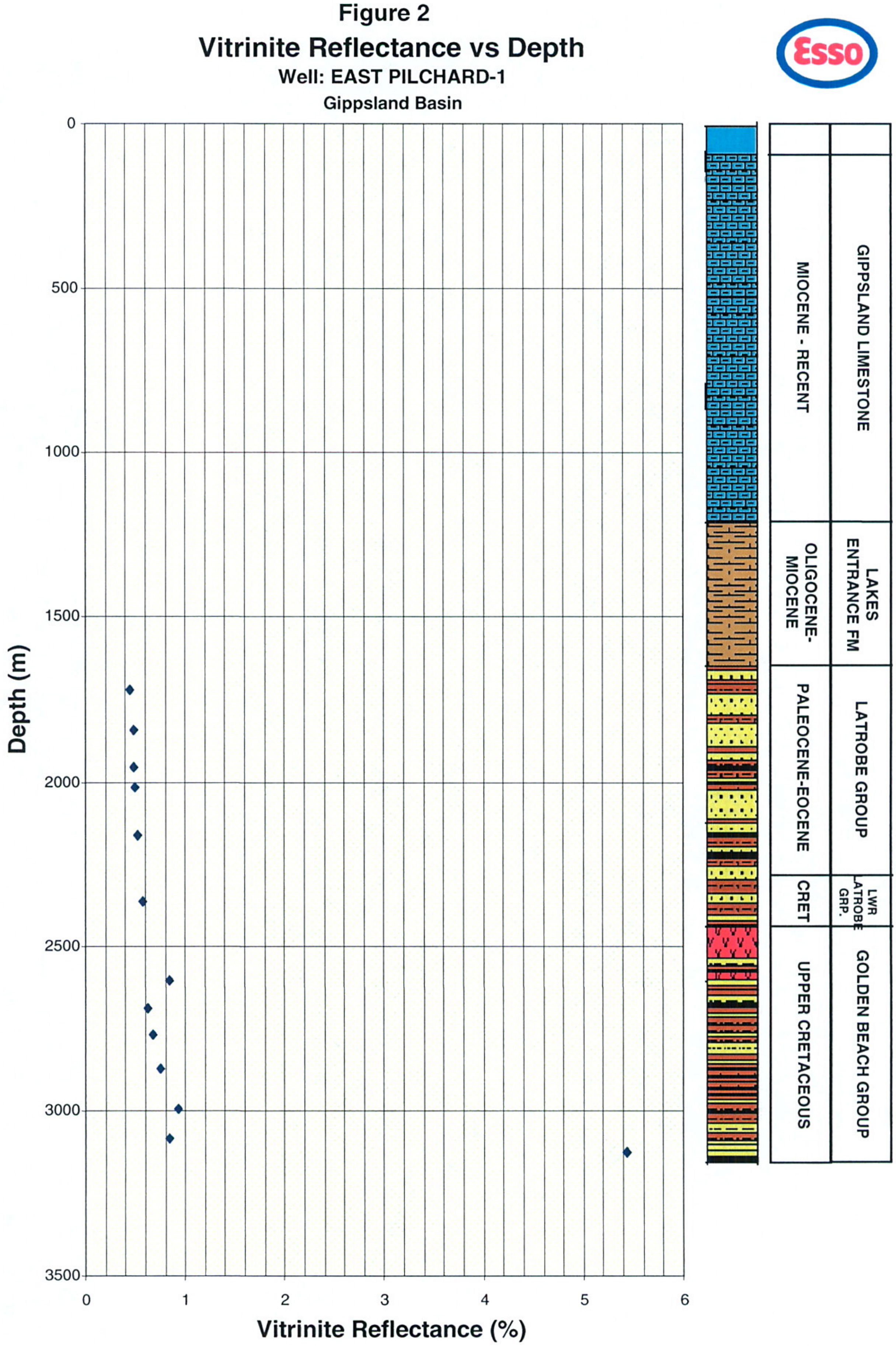
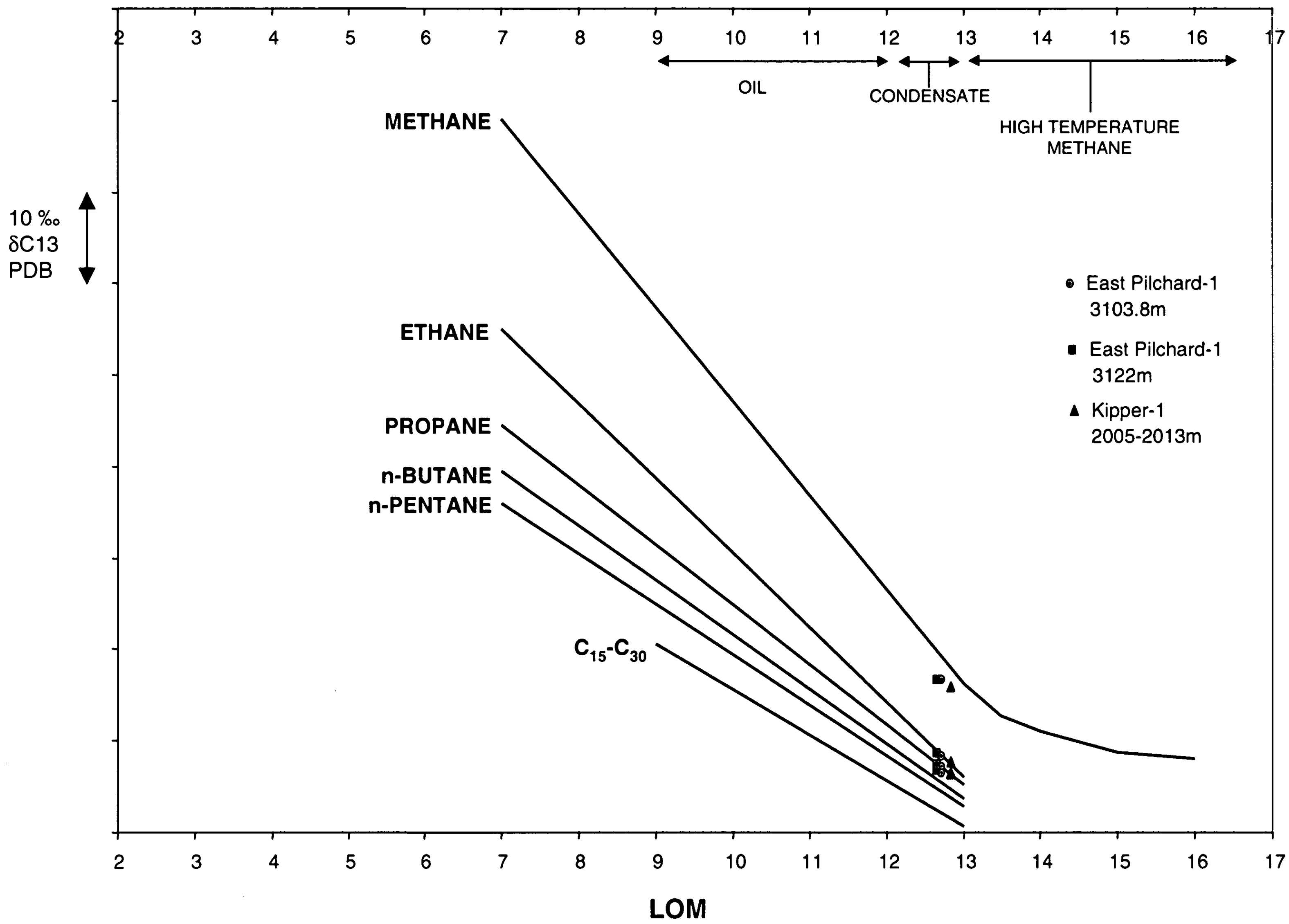


Figure 3

EAST PILCHARD-1 GASES
LEVEL OF MATURITY (LOM) PLOT



After James, 1983

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APPENDIX 1

Details of vitrinite reflectance measurements
Keiraville Konsultants

R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range
0.10			0.40			0.70			1.00			1.30			1.60			1.90			2.20			2.50		
0.11			0.41			0.71			1.01			1.31			1.61			1.91			2.21			2.51		
0.12			0.42	2		0.72			1.02			1.32			1.62			1.92			2.22			2.52		
0.13			0.43	2		0.73			1.03			1.33			1.63			1.93			2.23			2.53		
0.14			0.44	4		0.74			1.04			1.34			1.64			1.94			2.24			2.54		
0.15			0.45	3		0.75			1.05			1.35			1.65			1.95			2.25			2.55		
0.16			0.46	1		0.76			1.06			1.36			1.66			1.96			2.26			2.56		
0.17			0.47	3		0.77			1.07			1.37			1.67			1.97			2.27			2.57		
0.18			0.48	5		0.78			1.08			1.38			1.68			1.98			2.28			2.58		
0.19			0.49			0.79			1.09			1.39			1.69			1.99			2.29			2.59		
0.20			0.50	1	FGV	0.80			1.10			1.40			1.70			2.00			2.30			2.60		
0.21			0.51	2	↓	0.81			1.11			1.41			1.71			2.01			2.31			2.61		
0.22			0.52			0.82			1.12			1.42			1.72			2.02			2.32			2.62		
0.23			0.53			0.83			1.13			1.43			1.73			2.03			2.33			2.63		
0.24			0.54			0.84			1.14			1.44			1.74			2.04			2.34			2.64		
0.25			0.55			0.85			1.15			1.45			1.75			2.05			2.35			2.65		
0.26			0.56			0.86			1.16			1.46			1.76			2.06			2.36			2.66		
0.27			0.57			0.87			1.17			1.47			1.77			2.07			2.37			2.67		
0.28			0.58			0.88			1.18			1.48			1.78			2.08			2.38			2.68		
0.29			0.59			0.89			1.19			1.49			1.79			2.09			2.39			2.69		
0.30			0.60			0.90			1.20			1.50			1.80			2.10			2.40			2.70		
0.31			0.61			0.91			1.21			1.51			1.81			2.11			2.41			2.71		
0.32			0.62			0.92			1.22			1.52			1.82			2.12			2.42			2.72		
0.33			0.63			0.93			1.23			1.53			1.83			2.13			2.43			2.73		
0.34			0.64			0.94			1.24			1.54			1.84			2.14			2.44			2.74		
0.35			0.65			0.95			1.25			1.55			1.85			2.15			2.45			2.75		
0.36			0.66			0.96			1.26			1.56			1.86			2.16			2.46			2.76		
0.37			0.67			0.97			1.27			1.57			1.87			2.17			2.47			2.77		
0.38	1	↑	0.68			0.98			1.28			1.58			1.88			2.18			2.48			2.78		
0.39	1	FGV	0.69			0.99			1.29			1.59			1.89			2.19			2.49			2.79		

VITRINITE 50.0 %		INERTINITE 2.5 %						LIPTINITE 11.5 %								OIL DROPS	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor	Cut	Sub	Res	Ld	Bituminite	Telalginite	Lamalginite	Oil cut	
								2.0	3.0	3.5	2.0	1.0					

Sample Number..T8076..................Well Name..ESSO, E PILCHARD.. Depth...1715-1720m......... .... SampleType....Ctgs....

Date. ..22/.12/'2001.. Op..SPR......... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite, Cav - Cavings,

DA - Drilling Mud Additives Copyright Keiraville Konsultants MICR D:\RWORK.ms6\EssoVRW.doc

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R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range
0.10			0.40			0.70			1.00			1.30			1.60	1	Inert	1.90			2.20			2.50		
0.11			0.41			0.71			1.01			1.31			1.61			1.91			2.21			2.51		
0.12			0.42	3		0.72			1.02			1.32	1		1.62			1.92			2.22			2.52		
0.13			0.43			0.73			1.03			1.33			1.63			1.93			2.23			2.53		
0.14			0.44	2		0.74			1.04	1		1.34			1.64			1.94			2.24			2.54		
0.15			0.45	2		0.75			1.05			1.35			1.65			1.95			2.25			2.55		
0.16			0.46	2		0.76			1.06			1.36			1.66			1.96			2.26			2.56		
0.17			0.47			0.77			1.07			1.37			1.67			1.97			2.27			2.57		
0.18			0.48	3		0.78			1.08			1.38	1	Inert	1.68			1.98			2.28			2.58		
0.19			0.49	2		0.79			1.09			1.39			1.69			1.99			2.29			2.59		
0.20			0.50	1		0.80			1.10			1.40			1.70			2.00			2.30			2.60		
0.21			0.51	3		0.81			1.11			1.41			1.71			2.01			2.31			2.61		
0.22			0.52			0.82			1.12			1.42			1.72			2.02			2.32			2.62		
0.23			0.53			0.83			1.13			1.43			1.73			2.03			2.33			2.63		
0.24			0.54	3		0.84			1.14			1.44			1.74			2.04			2.34			2.64		
0.25			0.55			0.85			1.15			1.45			1.75			2.05			2.35			2.65		
0.26			0.56			0.86			1.16			1.46			1.76			2.06		Inert	2.36			2.66		
0.27			0.57	1		0.87			1.17			1.47			1.77			2.07			2.37			2.67		
0.28			0.58			0.88			1.18			1.48			1.78			2.08			2.38			2.68		
0.29			0.59			0.89			1.19			1.49			1.79			2.09			2.39			2.69		
0.30			0.60		FGV	0.90			1.20			1.50			1.80			2.10			2.40			2.70		
0.31			0.61	1	↓	0.91			1.21			1.51			1.81			2.11			2.41			2.71		
0.32			0.62			0.92			1.22			1.52			1.82			2.12			2.42			2.72		
0.33			0.63			0.93			1.23			1.53			1.83			2.13			2.43		Inert	2.73		
0.34			0.64			0.94	1	↑	1.24			1.54			1.84			2.14			2.44	1	↓	2.74		
0.35			0.65			0.95		Inert	1.25			1.55			1.85			2.15			2.45			2.75		
0.36			0.66			0.96	1		1.26	1	Inert	1.56			1.86			2.16			2.46			2.76		
0.37			0.67			0.97			1.27			1.57			1.87			2.17			2.47			2.77		
0.38	1	↑	0.68			0.98			1.28	1		1.58	1		1.88			2.18			2.48			2.78		
0.39	1	FGV	0.69			0.99			1.29			1.59			1.89			2.19			2.49			2.79		

VITRINITE 5.0 %		INERTINITE 8.0 %						LIPTINITE 3.6 %								OIL DROPS <0.1	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor 2.0	Cut 0.2	Sub 0.1	Res 1.0	Ld 0.3	Bituminite	Telalginite	Lamalginite	Oil cut	

Sample Number..T8077.....Well Name..ESSO, E PILCHARD.. Depth...1835-1840m......... .... SampleType....Ctgs....

Date. ..22/.12/.2001... ..Op..SPR......... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite,

Caw - Cavings, DA - Drilling Mud Additives MICR D:\RWORK.ms6\ EssoVRW.doc

R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range
0.10			0.40			0.70			1.00			1.30	2		1.60			1.90			2.20			2.50		
0.11			0.41	1		0.71			1.01			1.31			1.61			1.91			2.21			2.51		
0.12			0.42	2		0.72			1.02	1		1.32			1.62			1.92			2.22			2.52		
0.13			0.43	1		0.73			1.03			1.33		Inert	1.63			1.93			2.23			2.53		
0.14			0.44	3		0.74			1.04			1.34	1	↓	1.64			1.94			2.24			2.54		
0.15			0.45	1		0.75			1.05			1.35			1.65			1.95			2.25			2.55		
0.16			0.46	1		0.76			1.06			1.36			1.66			1.96			2.26			2.56		
0.17			0.47	1		0.77			1.07			1.37			1.67			1.97			2.27			2.57		
0.18			0.48			0.78			1.08			1.38			1.68			1.98			2.28			2.58		
0.19			0.49	2		0.79			1.09			1.39			1.69			1.99			2.29			2.59		
0.20			0.50	3		0.80			1.10			1.40			1.70			2.00			2.30			2.60		
0.21			0.51	1		0.81			1.11			1.41			1.71			2.01			2.31			2.61		
0.22			0.52	3		0.82			1.12	1		1.42			1.72			2.02			2.32			2.62		
0.23			0.53	3		0.83			1.13			1.43			1.73			2.03			2.33			2.63		
0.24			0.54	1		0.84			1.14	1		1.44			1.74			2.04			2.34			2.64		
0.25			0.55		FGV	0.85			1.15			1.45			1.75			2.05			2.35			2.65		
0.26			0.56	1	↓	0.86			1.16	1		1.46			1.76			2.06			2.36			2.66		
0.27			0.57			0.87			1.17			1.47			1.77			2.07			2.37			2.67		
0.28			0.58			0.88			1.18			1.48			1.78			2.08			2.38			2.68		
0.29			0.59			0.89			1.19			1.49			1.79			2.09			2.39			2.69		
0.30			0.60			0.90			1.20			1.50			1.80			2.10			2.40			2.70		
0.31			0.61			0.91			1.21			1.51			1.81			2.11			2.41			2.71		
0.32			0.62			0.92	1	↑	1.22	1	Inert	1.52			1.82			2.12			2.42			2.72		
0.33			0.63			0.93		Inert	1.23			1.53			1.83			2.13			2.43			2.73		
0.34			0.64			0.94			1.24	1		1.54			1.84			2.14			2.44			2.74		
0.35			0.65			0.95			1.25			1.55			1.85			2.15			2.45			2.75		
0.36			0.66			0.96			1.26			1.56			1.86			2.16			2.46			2.76		
0.37			0.67			0.97			1.27			1.57			1.87			2.17			2.47			2.77		
0.38			0.68			0.98			1.28			1.58			1.88			2.18			2.48			2.78		
0.39	1	↑	0.69			0.99			1.29			1.59			1.89			2.19			2.49			2.79		

VITRINITE 6.0 %		INERTINITE 2.5 %						LIPTINITE 3.9 %								OIL DROPS	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor 2.5	Cut 0.2	Sub 0.3	Res 0.3	Ld 0.6	Bituminite	Telalginite	Lamalginite	Oil cut	

Sample Number..T8078.....Well Name..ESSO, E PILCHARD.. Depth...1950-1955m........ .... SampleType....Ctgs....

Date. ..22/.12/.2001.. ..Op..SPR......... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite,

Cav - Cavings, DA - Drilling Mud Additives MICR D:\RWORK.ms6\ EssoVRW.doc

R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range
0.10			0.40			0.70			1.00			1.30			1.60			1.90			2.20			2.50		
0.11			0.41			0.71			1.01			1.31			1.61			1.91			2.21			2.51		
0.12			0.42			0.72			1.02			1.32			1.62			1.92			2.22			2.52		
0.13			0.43			0.73			1.03			1.33			1.63			1.93			2.23			2.53		
0.14			0.44	2		0.74			1.04			1.34			1.64			1.94			2.24			2.54		
0.15			0.45			0.75			1.05			1.35			1.65			1.95			2.25			2.55		
0.16			0.46			0.76			1.06			1.36			1.66			1.96			2.26			2.56		
0.17			0.47	3		0.77			1.07			1.37			1.67			1.97			2.27			2.57		
0.18			0.48	3		0.78			1.08			1.38			1.68			1.98			2.28			2.58		
0.19			0.49	3		0.79			1.09			1.39			1.69			1.99			2.29			2.59		
0.20			0.50			0.80			1.10			1.40			1.70			2.00			2.30			2.60		
0.21			0.51	3		0.81			1.11			1.41			1.71			2.01			2.31			2.61		
0.22			0.52	1		0.82			1.12			1.42			1.72			2.02			2.32			2.62		
0.23			0.53	2		0.83			1.13			1.43			1.73			2.03			2.33			2.63		
0.24			0.54	2		0.84			1.14			1.44			1.74			2.04			2.34			2.64		
0.25			0.55	4		0.85			1.15			1.45			1.75			2.05			2.35			2.65		
0.26			0.56			0.86			1.16			1.46			1.76			2.06			2.36			2.66		
0.27			0.57		FGV	0.87			1.17			1.47			1.77			2.07			2.37			2.67		
0.28			0.58	1	↓	0.88			1.18			1.48			1.78			2.08			2.38			2.68		
0.29			0.59			0.89			1.19			1.49			1.79			2.09			2.39			2.69		
0.30			0.60			0.90			1.20			1.50			1.80			2.10			2.40			2.70		
0.31			0.61			0.91			1.21			1.51			1.81			2.11			2.41			2.71		
0.32			0.62			0.92			1.22			1.52			1.82			2.12			2.42			2.72		
0.33			0.63			0.93			1.23			1.53			1.83			2.13			2.43			2.73		
0.34			0.64			0.94			1.24			1.54			1.84			2.14			2.44			2.74		
0.35			0.65			0.95			1.25			1.55			1.85			2.15			2.45			2.75		
0.36			0.66			0.96			1.26			1.56			1.86			2.16			2.46			2.76		
0.37			0.67			0.97			1.27			1.57			1.87			2.17			2.47			2.77		
0.38			0.68			0.98			1.28			1.58			1.88			2.18			2.48			2.78		
0.39	1	↑	0.69			0.99			1.29			1.59			1.89			2.19			2.49			2.79		

VITRINITE 24.0 %		INERTINITE 48.0 %						LIPTINITE 8.3 %								OIL DROPS	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor 4.0	Cut 0.3	Sub 2.0	Res 1.0	Ld 1.0	Bituminite	Telalginite	Lamalginite	Oil cut	

Sample Number..T8079.....Well Name..ESSO, E PILCHARD.. Depth...2014m......... .... SampleType....SWC....

Date. ..22/.12/.2001.. Op..SPR......... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite,

Cav - Cavings, DA - Drilling Mud Additives MICR D:\RWORK.ms6\ EssoVRW.doc

R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range
0.10			0.40			0.70			1.00			1.30			1.60			1.90			2.20			2.50		
0.11			0.41			0.71			1.01			1.31			1.61			1.91			2.21			2.51		
0.12			0.42			0.72			1.02			1.32	1		1.62			1.92			2.22			2.52		
0.13			0.43			0.73			1.03			1.33			1.63			1.93			2.23			2.53		
0.14			0.44	1	↑	0.74			1.04	2		1.34			1.64			1.94			2.24			2.54		
0.15			0.45	2	FGV	0.75			1.05			1.35			1.65			1.95			2.25			2.55		
0.16			0.46			0.76			1.06	1		1.36			1.66			1.96			2.26			2.56		
0.17			0.47	1		0.77			1.07			1.37			1.67			1.97			2.27			2.57		
0.18			0.48	2		0.78			1.08			1.38			1.68			1.98			2.28			2.58		
0.19			0.49			0.79			1.09			1.39			1.69			1.99			2.29			2.59		
0.20			0.50	2		0.80			1.10			1.40			1.70			2.00			2.30			2.60		
0.21			0.51	1		0.81			1.11			1.41			1.71			2.01			2.31			2.61		
0.22			0.52	1		0.82			1.12			1.42			1.72			2.02			2.32			2.62		
0.23			0.53	1		0.83			1.13			1.43			1.73			2.03			2.33			2.63		
0.24			0.54	5		0.84			1.14			1.44			1.74			2.04			2.34			2.64		
0.25			0.55	1		0.85			1.15			1.45			1.75			2.05			2.35			2.65		
0.26			0.56			0.86			1.16			1.46			1.76			2.06			2.36			2.66		
0.27			0.57	3		0.87			1.17			1.47			1.77			2.07			2.37			2.67		
0.28			0.58	2		0.88			1.18	1		1.48			1.78			2.08			2.38			2.68		
0.29			0.59			0.89			1.19			1.49			1.79			2.09			2.39			2.69		
0.30			0.60	2		0.90			1.20	1		1.50			1.80			2.10			2.40			2.70		
0.31			0.61			0.91			1.21			1.51			1.81			2.11			2.41			2.71		
0.32			0.62			0.92	1	↑	1.22	2	Inert	1.52			1.82			2.12			2.42			2.72		
0.33			0.63			0.93		Inert	1.23			1.53		Inert	1.83			2.13			2.43			2.73		
0.34			0.64		FGV	0.94			1.24			1.54	1	↓	1.84			2.14			2.44			2.74		
0.35			0.65	1	↓	0.95			1.25			1.55			1.85			2.15			2.45			2.75		
0.36			0.66			0.96			1.26			1.56			1.86			2.16			2.46			2.76		
0.37			0.67			0.97			1.27			1.57			1.87			2.17			2.47			2.77		
0.38			0.68			0.98			1.28			1.58			1.88			2.18			2.48			2.78		
0.39			0.69			0.99			1.29			1.59			1.89			2.19			2.49			2.79		

VITRINITE 1.5 %		INERTINITE 0.4 %						LIPTINITE 0.8 %								OIL DROPS	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor 0.6	Cut <0.1	Sub	Res	Ld 0.2	Bituminite	Telalginite	Lamalginite	Oil cut	

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Sample Number..T8080.....Well Name..ESSO, E PILCHARD.. Depth...2155-2160 m........ .... SampleType....Ctgs....

Date. ..22/.12/ 2001.. Op..SPR......... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite,

Cav - Cavings, DA - Drilling Mud Additives MICR D:\RWORK.ms6\ EssoVRW.doc

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R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range
0.10			0.40			0.70			1.00			1.30			1.60			1.90			2.20			2.50		
0.11			0.41			0.71			1.01			1.31			1.61			1.91			2.21			2.51		
0.12			0.42			0.72			1.02	1	↑	1.32			1.62			1.92			2.22			2.52		
0.13			0.43			0.73			1.03		Inert	1.33			1.63			1.93			2.23			2.53		
0.14			0.44			0.74			1.04			1.34	2		1.64			1.94			2.24			2.54		
0.15			0.45			0.75			1.05			1.35			1.65			1.95			2.25			2.55		
0.16			0.46			0.76			1.06			1.36			1.66			1.96			2.26			2.56		
0.17			0.47			0.77			1.07			1.37			1.67			1.97			2.27			2.57		
0.18			0.48			0.78			1.08			1.38			1.68			1.98			2.28			2.58		
0.19			0.49	1	↑	0.79			1.09			1.39			1.69			1.99			2.29			2.59		
0.20			0.50		FGV	0.80			1.10	1		1.40			1.70			2.00			2.30			2.60		
0.21			0.51	2		0.81			1.11			1.41			1.71			2.01			2.31			2.61		
0.22			0.52	1		0.82			1.12			1.42			1.72			2.02			2.32			2.62		
0.23			0.53			0.83			1.13			1.43			1.73			2.03			2.33			2.63		
0.24			0.54	1		0.84			1.14			1.44			1.74			2.04			2.34			2.64		
0.25			0.55	2		0.85			1.15			1.45			1.75			2.05			2.35			2.65		
0.26			0.56	1		0.86			1.16			1.46			1.76			2.06			2.36			2.66		
0.27			0.57	2		0.87			1.17			1.47			1.77			2.07			2.37			2.67		
0.28			0.58	3		0.88			1.18			1.48	1		1.78			2.08			2.38			2.68		
0.29			0.59	3		0.89			1.19			1.49			1.79			2.09			2.39			2.69		
0.30			0.60	2		0.90			1.20			1.50	1	Inert	1.80			2.10			2.40			2.70		
0.31			0.61			0.91			1.21			1.51			1.81			2.11			2.41			2.71		
0.32			0.62	2		0.92			1.22			1.52			1.82			2.12			2.42			2.72		
0.33			0.63	2		0.93			1.23			1.53			1.83		Inert	2.13			2.43			2.73		
0.34			0.64	1		0.94			1.24	2		1.54			1.84	1	↓	2.14			2.44			2.74		
0.35			0.65			0.95			1.25			1.55			1.85			2.15			2.45			2.75		
0.36			0.66	1		0.96			1.26			1.56	1		1.86			2.16			2.46			2.76		
0.37			0.67			0.97			1.27			1.57			1.87			2.17			2.47			2.77		
0.38			0.68		FGV	0.98			1.28			1.58			1.88			2.18			2.48			2.78		
0.39			0.69	1	↓	0.99			1.29			1.59			1.89			2.19			2.49			2.79		

VITRINITE 1.2 %		INERTINITE 0.5%						LIPTINITE 1.0 %								OIL DROPS	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor	Cut	Sub	Res	Ld	Bituminite	Telalginite	Lamalginite	Oil cut	
								0.6	<0.1	0.2	<0.1	0.2					

Sample Number..T8081.....Well Name..ESSO, E PILCHARD.. Depth...2360-2365 m........ .... SampleType....Ctgs....
Date. ..22/.12/ 2001.. Op..SPR......... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite,
Cav - Cavings, DA - Drilling Mud Additives MICR D:\RWORK.ms6\ EssoVRW.doc

R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range
0.10			0.40			0.70			1.00			1.30			1.60			1.90			2.20			2.50		
0.11			0.41			0.71			1.01			1.31			1.61			1.91			2.21			2.51		
0.12			0.42			0.72			1.02			1.32			1.62			1.92			2.22			2.52		
0.13			0.43			0.73			1.03			1.33			1.63			1.93			2.23			2.53		
0.14			0.44			0.74			1.04			1.34			1.64	1		1.94			2.24			2.54		
0.15			0.45			0.75			1.05			1.35			1.65			1.95			2.25			2.55		
0.16			0.46			0.76			1.06			1.36			1.66			1.96	1	Inert	2.26			2.56		
0.17			0.47			0.77	1	↑	1.07			1.37			1.67			1.97			2.27			2.57		
0.18			0.48			0.78	3	FGV	1.08			1.38			1.68			1.98			2.28			2.58		
0.19			0.49			0.79			1.09			1.39			1.69			1.99			2.29			2.59		
0.20			0.50			0.80	1		1.10			1.40	1	Inert	1.70			2.00			2.30			2.60		
0.21			0.51			0.81	2		1.11			1.41			1.71			2.01			2.31			2.61		
0.22			0.52			0.82	2		1.12			1.42			1.72			2.02			2.32			2.62		
0.23			0.53			0.83	5		1.13			1.43			1.73			2.03			2.33			2.63		
0.24			0.54			0.84	3		1.14			1.44			1.74	1	Inert	2.04			2.34			2.64		
0.25			0.55			0.85	1		1.15			1.45			1.75			2.05			2.35			2.65		
0.26			0.56			0.86			1.16			1.46			1.76			2.06			2.36			2.66		
0.27			0.57			0.87	1		1.17			1.47			1.77			2.07			2.37		Inert	2.67		
0.28			0.58			0.88			1.18	1	↑	1.48			1.78			2.08			2.38	1	↓	2.68		
0.29			0.59			0.89	2		1.19		Inert	1.49			1.79			2.09			2.39			2.69		
0.30			0.60			0.90	2		1.20			1.50			1.80	1		2.10			2.40			2.70		
0.31			0.61			0.91			1.21			1.51			1.81			2.11			2.41			2.71		
0.32			0.62			0.92	1	FGV	1.22	1		1.52			1.82			2.12			2.42			2.72		
0.33			0.63			0.93	1	↓	1.23			1.53			1.83			2.13			2.43			2.73		
0.34			0.64			0.94			1.24			1.54			1.84			2.14			2.44			2.74		
0.35			0.65			0.95			1.25			1.55			1.85			2.15			2.45			2.75		
0.36			0.66			0.96			1.26			1.56			1.86	1		2.16			2.46			2.76		
0.37			0.67			0.97			1.27			1.57			1.87			2.17			2.47			2.77		
0.38			0.68			0.98			1.28			1.58			1.88			2.18	1		2.48			2.78		
0.39			0.69			0.99			1.29			1.59			1.89			2.19			2.49			2.79		

VITRINITE 70.0 %		INERTINITE 0.8 %						LIPTINITE 1.2 %								OIL DROPS	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor	Cut	Sub	Res	Ld	Bituminite	Telalginite	Lamalginite	Oil cut	
								0.8	<0.1		0.2	0.2					

Sample Number..T8082.....Well Name..ESSO, EAST PILCHARD.. Depth...2604..m........... .... SampleType....SWC....

Date. ..22/.12/ 2001.. Op..SPR......... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite,

Cav - Cavings, DA - Drilling Mud Additives MICR D:\RWORK.ms6\ EssoVRW.doc

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R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range
0.10			0.40			0.70	1	|	1.00			1.30			1.60			1.90			2.20			2.50		
0.11			0.41			0.71	1	|	1.01			1.31			1.61			1.91			2.21			2.51		
0.12			0.42			0.72	2	FGV	1.02			1.32			1.62			1.92			2.22			2.52		
0.13			0.43			0.73	2	↓	1.03			1.33			1.63			1.93			2.23			2.53		
0.14			0.44			0.74			1.04	1	↑	1.34			1.64			1.94			2.24			2.54		
0.15			0.45			0.75			1.05		Inert	1.35		Inert	1.65			1.95			2.25			2.55		
0.16			0.46			0.76			1.06			1.36	1	↓	1.66			1.96			2.26			2.56		
0.17			0.47			0.77			1.07			1.37			1.67			1.97			2.27			2.57		
0.18			0.48			0.78			1.08			1.38			1.68			1.98			2.28			2.58		
0.19			0.49			0.79			1.09			1.39			1.69			1.99			2.29			2.59		
0.20			0.50			0.80			1.10			1.40			1.70			2.00			2.30			2.60		
0.21			0.51	3	↑	0.81			1.11			1.41			1.71			2.01			2.31			2.61		
0.22			0.52		FGV	0.82			1.12			1.42			1.72			2.02			2.32			2.62		
0.23			0.53			0.83			1.13			1.43			1.73			2.03			2.33			2.63		
0.24			0.54			0.84			1.14			1.44			1.74			2.04			2.34			2.64		
0.25			0.55			0.85			1.15			1.45			1.75			2.05			2.35			2.65		
0.26			0.56	1		0.86			1.16			1.46			1.76			2.06			2.36			2.66		
0.27			0.57			0.87			1.17			1.47			1.77			2.07			2.37			2.67		
0.28			0.58	2		0.88			1.18			1.48			1.78			2.08			2.38			2.68		
0.29			0.59	1		0.89			1.19			1.49			1.79			2.09			2.39			2.69		
0.30			0.60	3		0.90			1.20			1.50			1.80			2.10			2.40			2.70		
0.31			0.61	4		0.91			1.21			1.51			1.81			2.11			2.41			2.71		
0.32			0.62			0.92			1.22			1.52			1.82			2.12			2.42			2.72		
0.33			0.63	1		0.93			1.23			1.53			1.83			2.13			2.43			2.73		
0.34			0.64	1		0.94			1.24			1.54			1.84			2.14			2.44			2.74		
0.35			0.65	1		0.95			1.25			1.55			1.85			2.15			2.45			2.75		
0.36			0.66	2		0.96			1.26	1		1.56			1.86			2.16			2.46			2.76		
0.37			0.67	3		0.97			1.27			1.57			1.87			2.17			2.47			2.77		
0.38			0.68	1		0.98			1.28			1.58			1.88			2.18			2.48			2.78		
0.39			0.69	1		0.99			1.29			1.59			1.89			2.19			2.49			2.79		

VITRINITE 5.0 %		INERTINITE 0.1 %						LIPTINITE 2.3 %								OIL DROPS	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor	Cut	Sub	Res	Ld	Bituminite	Telalginite	Lamalginite	Oil cut	
4.0	1.0							1.0	0.5		0.5	0.3					

Sample Number..T8083.....Well Name..ESSO, EAST PILCHARD.. Depth...2690..m........... .... SampleType....SWC....
Date. ..22/.12/.2001.. Op..ACC......... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite,
Cav - Cavings, DA - Drilling Mud Additives

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R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range
0.10			0.40			0.70	2		1.00			1.30	1		1.60	1		1.90			2.20			2.50		
0.11			0.41			0.71			1.01			1.31			1.61			1.91			2.21			2.51		
0.12			0.42			0.72	2		1.02			1.32			1.62			1.92			2.22			2.52		
0.13			0.43			0.73	2		1.03			1.33			1.63			1.93			2.23			2.53		
0.14			0.44			0.74	1		1.04			1.34	1		1.64			1.94			2.24			2.54		
0.15			0.45			0.75	1		1.05			1.35			1.65			1.95			2.25			2.55		
0.16			0.46			0.76			1.06			1.36			1.66			1.96			2.26			2.56		
0.17			0.47			0.77	1		1.07			1.37			1.67			1.97			2.27			2.57		
0.18			0.48			0.78			1.08			1.38			1.68			1.98			2.28			2.58		
0.19			0.49			0.79	1	FGV	1.09			1.39			1.69			1.99			2.29			2.59		
0.20			0.50			0.80	1	↓	1.10			1.40	1		1.70			2.00			2.30			2.60		
0.21			0.51			0.81			1.11			1.41			1.71			2.01			2.31			2.61		
0.22			0.52			0.82			1.12			1.42			1.72			2.02			2.32			2.62		
0.23			0.53			0.83			1.13			1.43			1.73			2.03			2.33			2.63		
0.24			0.54	1	↑	0.84			1.14			1.44	1		1.74			2.04			2.34			2.64		
0.25			0.55		FGV	0.85			1.15			1.45			1.75			2.05			2.35			2.65		
0.26			0.56			0.86			1.16	1	↑	1.46			1.76	1		2.06			2.36			2.66		
0.27			0.57			0.87			1.17		Inert	1.47			1.77			2.07			2.37			2.67		
0.28			0.58	1		0.88			1.18			1.48			1.78			2.08			2.38			2.68		
0.29			0.59	1		0.89			1.19			1.49			1.79			2.09			2.39			2.69		
0.30			0.60	1		0.90			1.20			1.50			1.80			2.10			2.40			2.70		
0.31			0.61	1		0.91			1.21			1.51			1.81			2.11			2.41			2.71		
0.32			0.62			0.92			1.22			1.52			1.82			2.12			2.42			2.72		
0.33			0.63			0.93			1.23			1.53			1.83		Inert	2.13			2.43			2.73		
0.34			0.64	2		0.94			1.24			1.54			1.84	1	↓	2.14			2.44			2.74		
0.35			0.65	3		0.95			1.25			1.55			1.85			2.15			2.45			2.75		
0.36			0.66	1		0.96			1.26			1.56	1		1.86			2.16			2.46			2.76		
0.37			0.67	1		0.97			1.27			1.57			1.87			2.17			2.47			2.77		
0.38			0.68	2		0.98			1.28			1.58	1		1.88			2.18			2.48			2.78		
0.39			0.69			0.99			1.29			1.59			1.89			2.19			2.49			2.79		

VITRINITE 0.4 %		INERTINITE 1.8 %						LIPTINITE 0.3 %								OIL DROPS	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor	Cut	Sub	Res	Ld	Bituminite	Telalginite	Lamalginite	Oil cut	
								0.2	<0.1			0.1					

Sample Number..T8084.....Well Name..ESSO, EAST PILCHARD.. Depth...2771..m........... .... SampleType....SWC....

Date. ..25/.12/ 2001.. Op..SPR......... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite,

Cav - Cavings, DA - Drilling Mud Additives MICR D:\RWORK.ms6\ EssoVRW.doc

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R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range
0.10			0.40			0.70			1.00			1.30			1.60			1.90			2.20			2.50		
0.11			0.41			0.71			1.01			1.31			1.61			1.91			2.21			2.51		
0.12			0.42			0.72			1.02			1.32			1.62			1.92			2.22			2.52		
0.13			0.43			0.73	1		1.03			1.33			1.63			1.93			2.23			2.53		
0.14			0.44			0.74			1.04			1.34	1	↑	1.64			1.94			2.24			2.54		
0.15			0.45			0.75	4		1.05			1.35		Inert	1.65			1.95			2.25			2.55		
0.16			0.46			0.76	1		1.06			1.36			1.66			1.96			2.26			2.56		
0.17			0.47			0.77	1		1.07			1.37			1.67			1.97			2.27			2.57		
0.18			0.48			0.78			1.08			1.38			1.68			1.98			2.28			2.58		
0.19			0.49			0.79			1.09			1.39			1.69			1.99			2.29			2.59		
0.20			0.50			0.80	1		1.10			1.40	1		1.70	1	Inert	2.00			2.30			2.60		
0.21			0.51			0.81			1.11			1.41			1.71			2.01			2.31			2.61		
0.22			0.52			0.82	1		1.12			1.42			1.72	1		2.02			2.32			2.62		
0.23			0.53	1	↑	0.83			1.13			1.43			1.73			2.03			2.33			2.63		
0.24			0.54		FGV	0.84	1		1.14			1.44			1.74			2.04			2.34			2.64		
0.25			0.55			0.85	1		1.15			1.45			1.75			2.05			2.35			2.65		
0.26			0.56			0.86			1.16			1.46	1		1.76			2.06			2.36			2.66		
0.27			0.57			0.87	2		1.17			1.47			1.77			2.07			2.37			2.67		
0.28			0.58			0.88			1.18			1.48	1		1.78			2.08	1		2.38			2.68		
0.29			0.59			0.89	2		1.19			1.49			1.79			2.09			2.39			2.69		
0.30			0.60			0.90			1.20			1.50			1.80			2.10			2.40			2.70		
0.31			0.61	2		0.91			1.21			1.51			1.81			2.11			2.41			2.71		
0.32			0.62			0.92	1		1.22			1.52	1		1.82			2.12			2.42			2.72		
0.33			0.63			0.93			1.23			1.53			1.83			2.13			2.43			2.73		
0.34			0.64	1		0.94			1.24			1.54			1.84			2.14			2.44			2.74		
0.35			0.65	1		0.95			1.25			1.55			1.85			2.15			2.45			2.75		
0.36			0.66	1		0.96		FGV	1.26			1.56	1		1.86			2.16			2.46			2.76		
0.37			0.67	2		0.97	1	↓	1.27			1.57			1.87			2.17		Inert	2.47			2.77		
0.38			0.68			0.98			1.28			1.58			1.88			2.18	1	↓	2.48			2.78		
0.39			0.69			0.99			1.29			1.59			1.89			2.19			2.49			2.79		

VITRINITE 0.1 %		INERTINITE 1.2 %						LIPTINITE - %								OIL DROPS	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor	Cut	Sub	Res	Ld	Bituminite	Telalginite	Lamalginite	Oil cut	

Sample Number..T8085.....Well Name..ESSO, EAST PILCHARD.. Depth...2870-2875 m........ .... SampleType....Ctgs....
Date. ..25/.12/.2001.. Op..SPR......... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite,
Cav - Cavings, DA - Drilling Mud Additives MICR D:\RWORK.ms6\ EssoVRW.doc

R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range
0.10			0.40			0.70			1.00	2		1.30			1.60	1		1.90			2.20			2.50		
0.11			0.41			0.71			1.01	2		1.31			1.61			1.91			2.21			2.51		
0.12			0.42			0.72			1.02	5	FGV	1.32			1.62	1	Inert	1.92			2.22			2.52		
0.13			0.43			0.73			1.03	2	↓	1.33			1.63			1.93			2.23			2.53		
0.14			0.44			0.74			1.04			1.34			1.64			1.94			2.24			2.54		
0.15			0.45			0.75			1.05	1	↑	1.35			1.65			1.95			2.25			2.55		
0.16			0.46			0.76	1		1.06	1	Inert	1.36	1	Inert	1.66			1.96			2.26			2.56		
0.17			0.47			0.77			1.07	2		1.37			1.67			1.97			2.27			2.57		
0.18			0.48			0.78	1		1.08			1.38			1.68			1.98			2.28			2.58		
0.19			0.49			0.79			1.09	1		1.39			1.69			1.99			2.29			2.59		
0.20			0.50			0.80	1		1.10	1		1.40	1		1.70			2.00			2.30			2.60		
0.21			0.51			0.81	1		1.11	1		1.41			1.71			2.01			2.31			2.61		
0.22			0.52			0.82	1		1.12			1.42			1.72			2.02			2.32			2.62		
0.23			0.53			0.83	1	↑	1.13			1.43			1.73			2.03			2.33			2.63		
0.24			0.54			0.84		FGV	1.14	1		1.44			1.74			2.04			2.34			2.64		
0.25			0.55			0.85	3		1.15			1.45			1.75			2.05			2.35			2.65		
0.26			0.56			0.86			1.16	3		1.46			1.76			2.06			2.36			2.66		
0.27			0.57			0.87			1.17	1		1.47			1.77			2.07			2.37			2.67		
0.28			0.58			0.88	1		1.18			1.48			1.78			2.08			2.38			2.68		
0.29			0.59			0.89	2		1.19	1		1.49			1.79			2.09		Inert	2.39			2.69		
0.30			0.60			0.90	1		1.20			1.50			1.80			2.10	1	↓	2.40			2.70		
0.31			0.61			0.91			1.21			1.51			1.81			2.11			2.41			2.71		
0.32			0.62			0.92			1.22	2		1.52			1.82			2.12			2.42			2.72		
0.33			0.63			0.93	1		1.23			1.53			1.83			2.13			2.43			2.73		
0.34			0.64			0.94	1		1.24			1.54			1.84			2.14			2.44			2.74		
0.35			0.65			0.95			1.25			1.55			1.85			2.15			2.45			2.75		
0.36			0.66			0.96	2		1.26			1.56			1.86			2.16			2.46			2.76		
0.37			0.67			0.97	2		1.27			1.57			1.87			2.17			2.47			2.77		
0.38			0.68			0.98			1.28	1		1.58			1.88			2.18			2.48			2.78		
0.39			0.69			0.99	2		1.29			1.59			1.89			2.19			2.49			2.79		

VITRINITE 0.3 %		INERTINITE 5.0 %						LIPTINITE 0.2 %								OIL DROPS	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor 0.1	Cut <0.1	Sub	Res	Ld 0.1	Bituminite	Telalginite	Lamalginite	Oil cut	

Sample Number..T8086.....Well Name..ESSO, EAST PILCHARD.. Depth...2997..m........... .... SampleType....SWC....
Date. ..22/.12/.2001.. Op..ACC......... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite,
Cav - Cavings, DA - Drilling Mud Additives D:\RWORK.ms6\ EssoVRW.doc

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R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range
0.10			0.40			0.70	1		1.00	1		1.30			1.60			1.90			2.20			2.50		
0.11			0.41			0.71			1.01			1.31			1.61			1.91			2.21			2.51		
0.12			0.42			0.72			1.02			1.32			1.62			1.92			2.22			2.52		
0.13			0.43			0.73			1.03			1.33			1.63			1.93			2.23			2.53		
0.14			0.44			0.74			1.04			1.34			1.64			1.94			2.24			2.54		
0.15			0.45			0.75	1		1.05			1.35			1.65			1.95			2.25			2.55		
0.16			0.46			0.76			1.06			1.36			1.66			1.96			2.26			2.56		
0.17			0.47			0.77	1		1.07			1.37			1.67			1.97			2.27			2.57		
0.18			0.48			0.78	1		1.08			1.38			1.68			1.98			2.28			2.58		
0.19			0.49			0.79	2		1.09			1.39			1.69			1.99			2.29			2.59		
0.20			0.50			0.80	1		1.10		FGV	1.40			1.70			2.00			2.30			2.60		
0.21			0.51			0.81	1		1.11	1	↓	1.41			1.71			2.01			2.31			2.61		
0.22			0.52			0.82	2		1.12			1.42			1.72			2.02	1	Inert	2.32			2.62		
0.23			0.53			0.83	1		1.13			1.43			1.73			2.03			2.33			2.63		
0.24			0.54			0.84	2		1.14			1.44			1.74	2	Inert	2.04			2.34			2.64		
0.25			0.55			0.85	2		1.15			1.45			1.75			2.05			2.35			2.65		
0.26			0.56			0.86			1.16			1.46			1.76			2.06			2.36			2.66		
0.27			0.57			0.87	2		1.17			1.47			1.77			2.07			2.37			2.67		Inert
0.28			0.58			0.88			1.18			1.48			1.78			2.08			2.38			2.68	1	↓
0.29			0.59			0.89			1.19			1.49			1.79			2.09			2.39			2.69		
0.30			0.60			0.90			1.20	2	↑	1.50			1.80			2.10			2.40	1	Inert	2.70		
0.31			0.61			0.91	3		1.21		Inert	1.51			1.81			2.11			2.41			2.71		
0.32			0.62			0.92			1.22			1.52	1	Inert	1.82			2.12			2.42			2.72		
0.33			0.63			0.93			1.23			1.53			1.83			2.13			2.43			2.73		
0.34			0.64			0.94			1.24			1.54			1.84			2.14			2.44			2.74		
0.35			0.65			0.95			1.25			1.55			1.85			2.15			2.45			2.75		
0.36			0.66			0.96	1		1.26			1.56			1.86			2.16			2.46			2.76		
0.37			0.67	1	↑	0.97			1.27			1.57			1.87			2.17			2.47			2.77		
0.38			0.68		FGV	0.98	1		1.28	1		1.58			1.88	1		2.18			2.48			2.78		
0.39			0.69			0.99			1.29			1.59			1.89			2.19			2.49			2.79		

VITRINITE 0.5 %		INERTINITE 2.8 %						LIPTINITE 0.3 %								OIL DROPS	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor	Cut	Sub	Res	Ld	Bituminite	Telalginite	Lamalginite	Oil cut	
								0.2	<0.1		<0.1	0.1					

Sample Number..T8087.....Well Name..ESSO, EAST PILCHARD...................................... Depth...3087.. m.......... .... SampleType....SWC.....
Date. ..25/.12/.2001.. .Op..SPR......... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite,
Cav - Cavings, DA - Drilling Mud Additives MICR D:\RWORK.ms6\ EssoVRW.doc

R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range	R	No Read	Pop Range
4.30			4.60			4.90			5.20	1		5.50			5.80			6.10			6.40			6.70		
4.31			4.61			4.91			5.21			5.51			5.81			6.11			6.41			6.71		
4.32			4.62			4.92			5.22			5.52	1		5.82			6.12			6.42			6.72		
4.33			4.63			4.93			5.23			5.53			5.83	1		6.13			6.43			6.73		
4.34			4.64			4.94			5.24	1		5.54			5.84			6.14			6.44			6.74		
4.35			4.65			4.95			5.25			5.55	3		5.85			6.15			6.45			6.75		
4.36			4.66			4.96			5.26			5.56	1		5.86			6.16			6.46			6.76		
4.37			4.67			4.97			5.27			5.57			5.87			6.17			6.47			6.77		
4.38			4.68			4.98	1		5.28			5.58			5.88	1		6.18			6.48			6.78		
4.39			4.69			4.99			5.29	1		5.59			5.89			6.19			6.49			6.79		
4.40			4.70			5.00			5.30	1		5.60			5.90			6.20			6.50			6.80		
4.41			4.71			5.01			5.31	1		5.61			5.91	1		6.21			6.51			6.81		
4.42			4.72			5.02			5.32			5.62			5.92			6.22			6.52			6.82		
4.43			4.73			5.03			5.33	1		5.63	1	FGV	5.93			6.23			6.55			6.83		
4.44			4.74			5.04			5.34	1		5.64			5.94			6.24			6.54			6.84		
4.45			4.75			5.05			5.35	1		5.65			5.95			6.25			6.55			6.85		
4.46			4.76			5.06			5.36			5.66			5.96			6.26			6.56			6.86		
4.47			4.77			5.07			5.37			5.67			5.97			6.27			6.57			6.87		
4.48			4.78			5.08			5.38	1		5.68			5.98			6.28			6.58			6.88		
4.49			4.79			5.09	1	FGV	5.39	1	FGV	5.69			5.99			6.29			6.59			6.89		
4.40			4.80			5.10			5.40			5.70			6.00			6.30			6.60			6.90		
4.51			4.81			5.11			5.41			5.71			6.01			6.31			6.61			6.91		
4.52			4.82	1	↑	5.12			5.42			5.72			6.02		FGV	6.32			6.62			6.92		
4.53			4.83		FGV	5.13			5.43			5.73			6.03	1	↓	6.33			6.63			6.93		
4.54			4.84			5.14			5.44			5.74			6.04			6.34			6.64			6.94		
4.55			4.85			5.15			5.45	1		5.75			6.05			6.35			6.65			6.95		
4.56			4.86			5.16			5.46	1		5.76			6.06			6.36			6.66			6.96		
4.57			4.87			5.17			5.47			5.77			6.07			6.37			6.67			6.97		
4.58			4.88			5.18			5.48			5.78			6.08			6.38			6.68			6.98		
4.59			4.89			5.19			5.49			5.79			6.09			6.39			6.69			6.99		

VITRINITE 0.3 %		INERTINITE 0.4 %						LIPTINITE - %								OIL DROPS	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor	Cut	Sub	Res	Ld	Bituminite	Telalginite	Lamalginite	Oil	cut

Sample Number..T8088.....Well Name..ESSO, EAST PILCHARD.. Depth...3127m.......... .... SampleType....SWC.....Date. ..25/.12/ 2001

Op..SPR......... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite,

Cav - Cavings, DA - Drilling Mud Additives MICR D:\RWORK.ms6\ EssoVRW.doc

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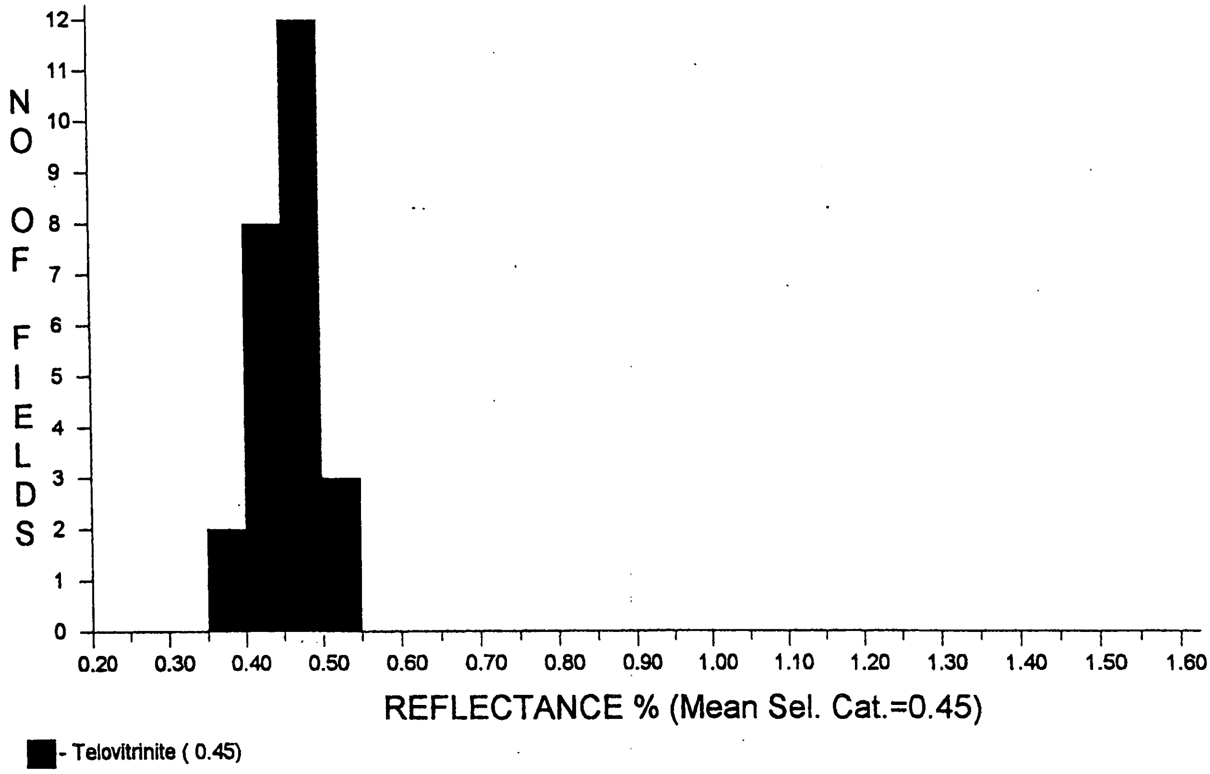
908923 151

ESSO, E PILCHARD, 1715-1720m, Ctgs (T8076)



Category	No. of Readings	Mean	Standard Deviation
Telovitrinite	25	0.45	0.033
Total:	25	0.45	0.033

Selected categories: Telovitrinite.

No. of readings:	25
Mean of selected categories:	0.45
Standard deviation of selected categories:	0.033

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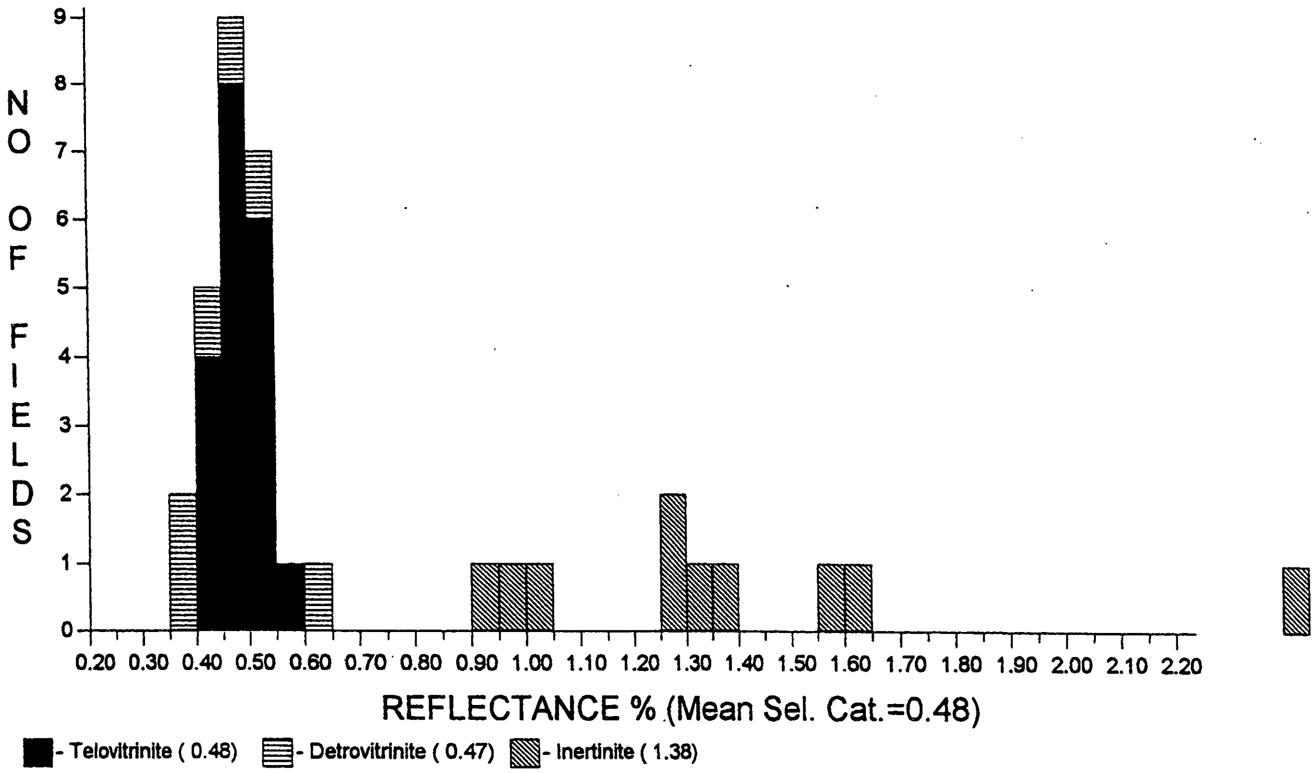
ESSO, E PILCHARD, 1835-1840m, Ctgs (T8077)



Category	No. of Readings	Mean	Standard Deviation
Telovitrinite	19	0.48	0.042
Detrovitrinite	6	0.47	0.082
Inertinite	10	1.38	0.415
Total:	35	0.74	0.466

Selected categories: Telovitrinite, Detrovitrinite,

No. of readings:	25
Mean of selected categories:	0.48
Standard deviation of selected categories:	0.054

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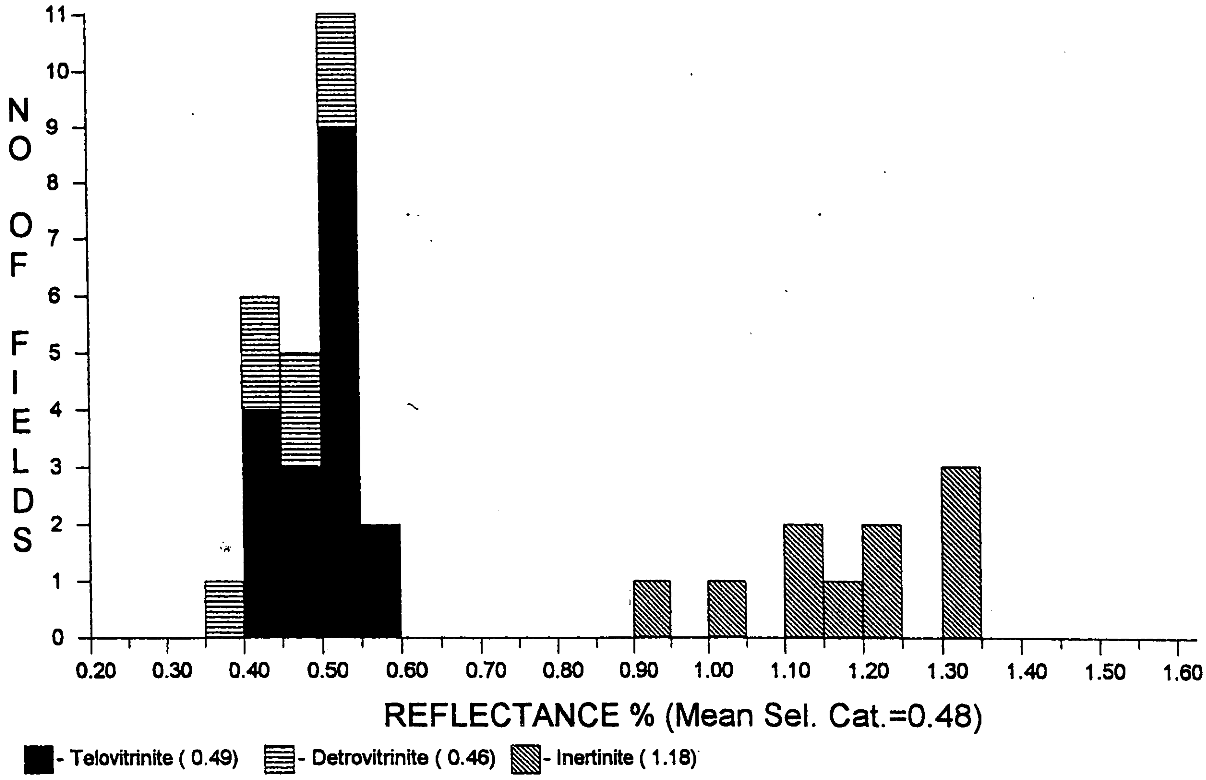
ESSO, E PILCHARD, 1950-1955m, Ctgs (T8078)



Category	No. of Readings	Mean	Standard Deviation
Telovitrinite	18	0.49	0.047
Detrovitrinite	7	0.46	0.037
Inertinite	10	1.18	0.126
Total:	35	0.68	0.322

Selected categories: Telovitrinite, Detrovitrinite,

No. of readings:	25
Mean of selected categories:	0.48
Standard deviation of selected categories:	0.047

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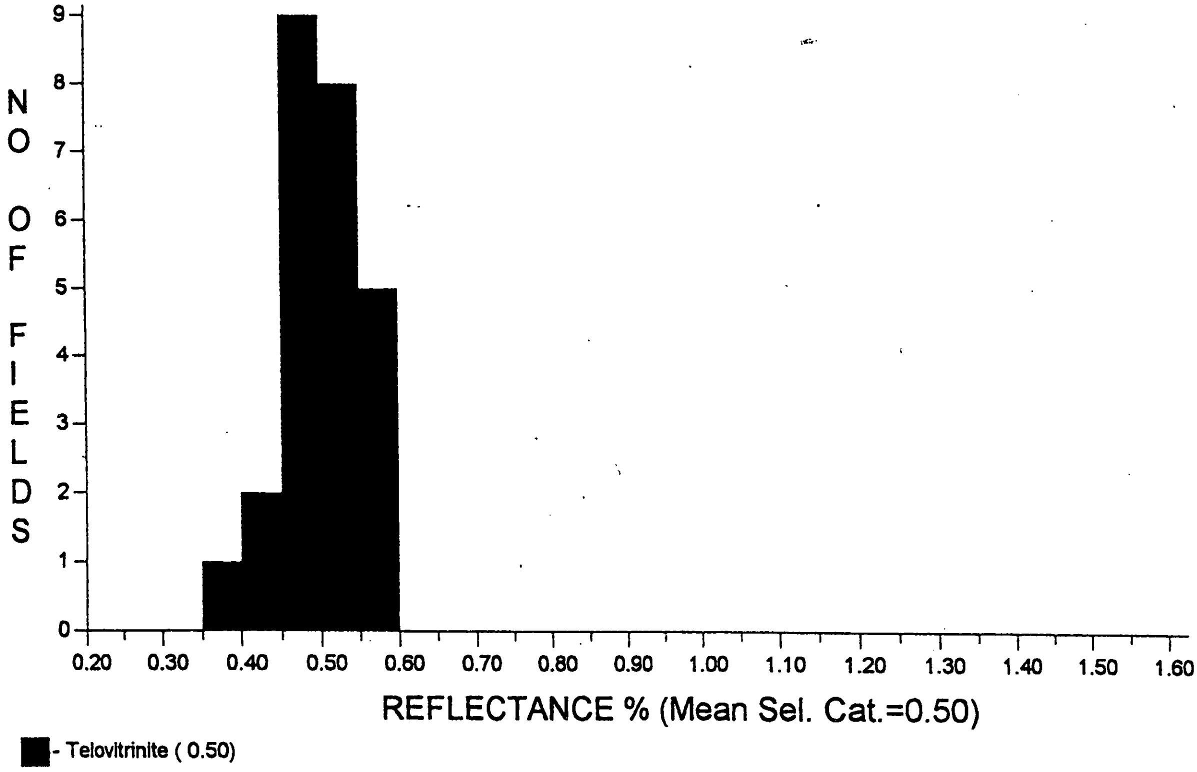
903923 154

ESSO, E PILCHARD, 2014m, SWC (T8079)



Category	No. of Readings	Mean	Standard Deviation
Telovitrinite	25	0.50	0.043
Total:	25	0.50	0.043

Selected categories: Telovitrinite.

No. of readings:	25
Mean of selected categories:	0.50
Standard deviation of selected categories:	0.043

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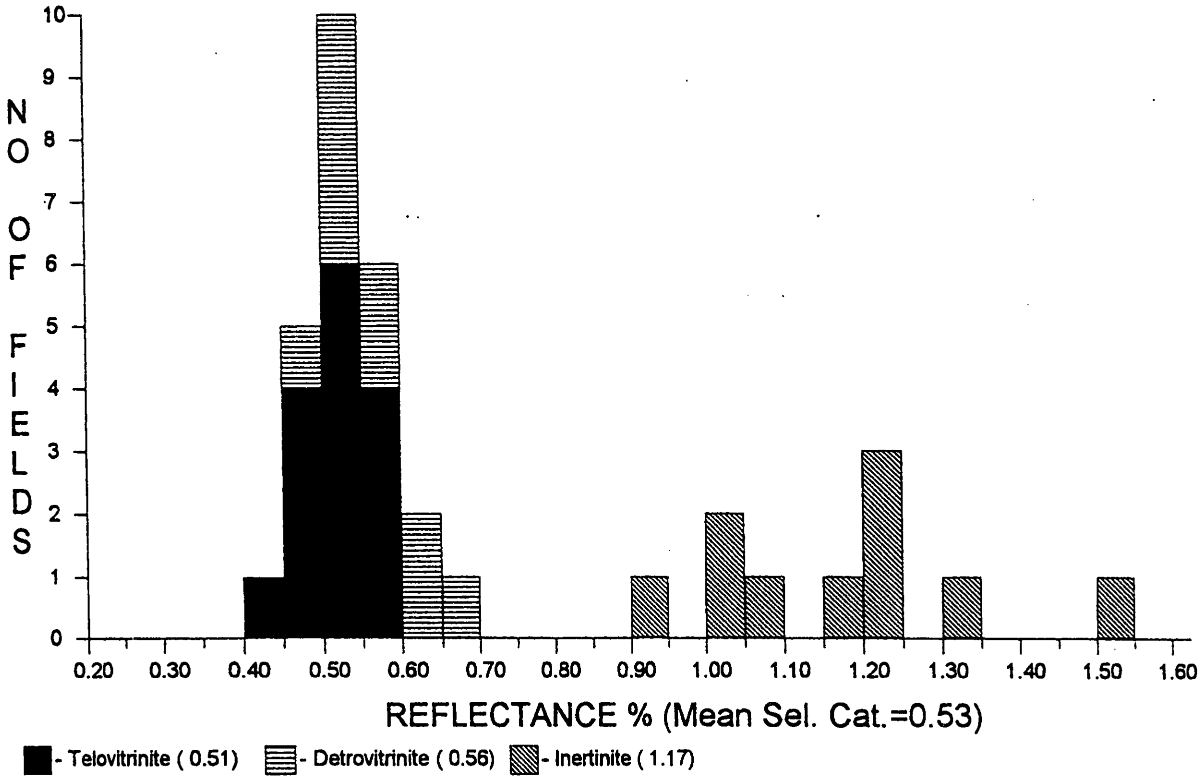
ESSO, E PILCHARD, 2155-2160m, Ctgs (T8080)



Category	No. of Readings	Mean	Standard Deviation
Telovitrinite	15	0.51	0.045
Detrovitrinite	10	0.56	0.050
Inertinite	10	1.17	0.165
Total:	35	0.72	0.306

Selected categories: Telovitrinite, Detrovitrinite,

No. of readings:	25
Mean of selected categories:	0.53
Standard deviation of selected categories:	0.052

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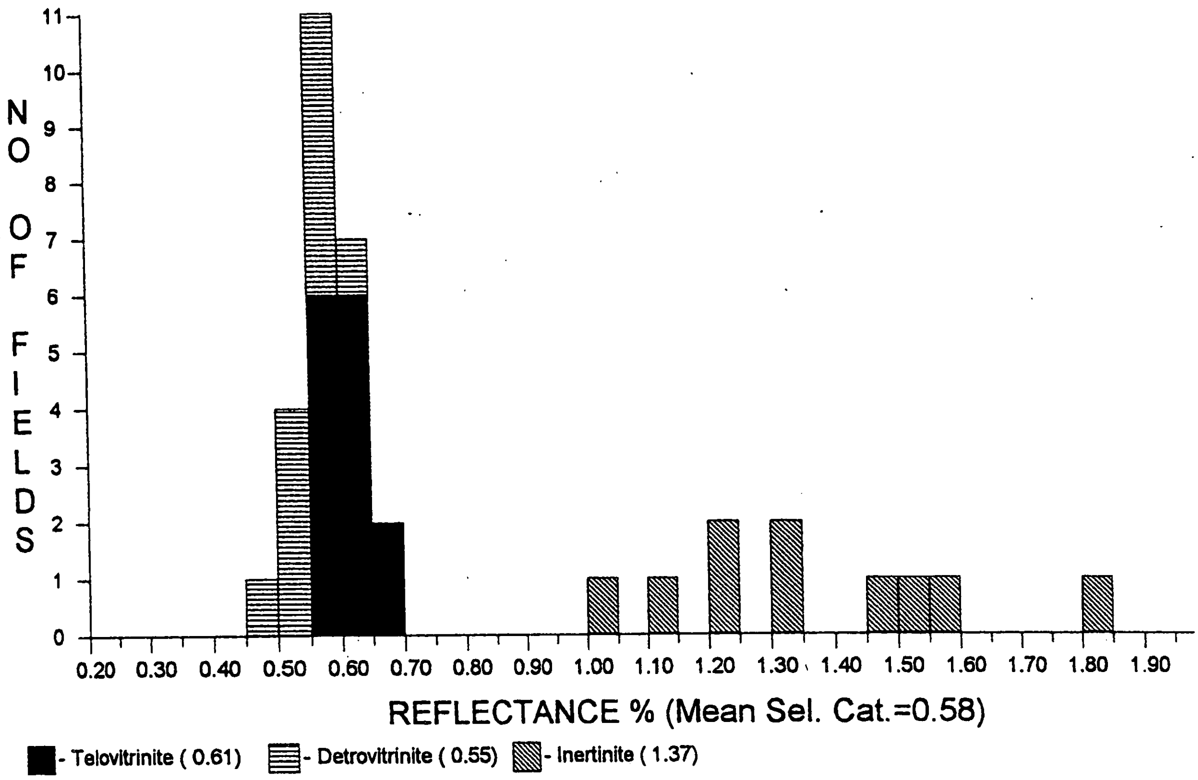
ESSO, E PILCHARD, 2360-2365m, Ctgs (T8081)



Category	No. of Readings	Mean	Standard Deviation
Telovitrinite	14	0.61	0.041
Detrovitrinite	11	0.55	0.038
Inertinite	10	1.37	0.227
Total:	35	0.81	0.376

Selected categories: Telovitrinite, Detrovitrinite,

No. of readings:	25
Mean of selected categories:	0.58
Standard deviation of selected categories:	0.048

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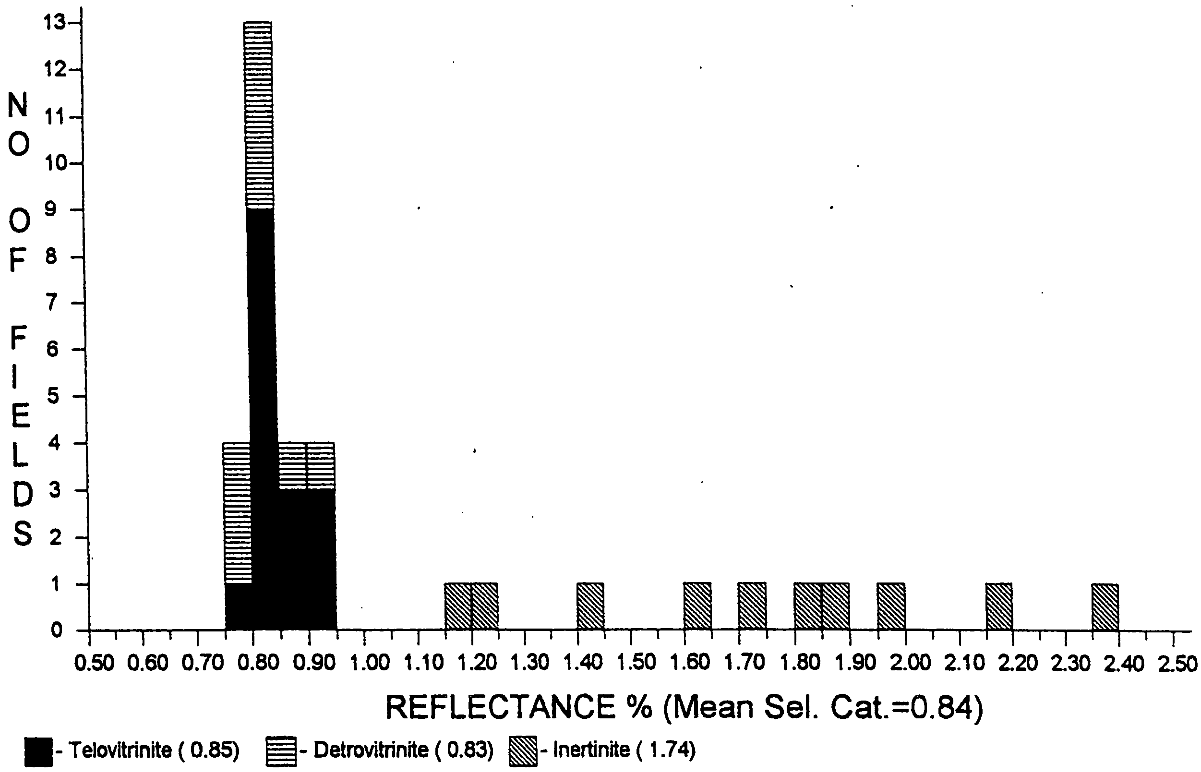
ESSO, E PILCHARD, 2604m, SWC (T8082)



Category	No. of Readings	Mean	Standard Deviation
Telovitrinite	16	0.85	0.040
Detrovitrinite	9	0.83	0.048
Inertinite	10	1.74	0.371
Total:	35	1.10	0.453

Selected categories: Telovitrinite, Detrovitrinite,

No. of readings:	25
Mean of selected categories:	0.84
Standard deviation of selected categories:	0.044

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Keiraville, NSW 2500
Australia.

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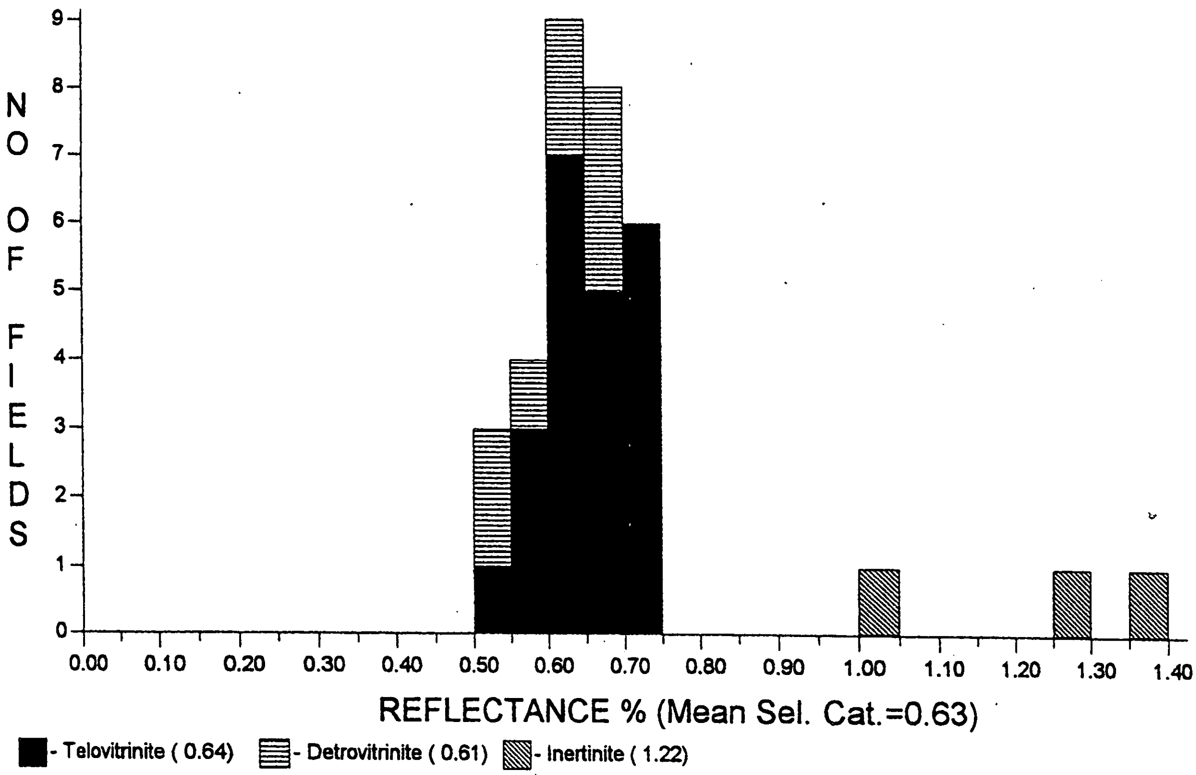
Fax: +61-(0)2-42 299624
Email: acc@ozemail.com.au

908923 158

ESSO East Pilchard-1, 2690 m, SWC (T8083)



Category	No. of Readings	Mean	Standard Deviation
Telovitrinite	22	0.64	0.060
Detrovitrinite	8	0.61	0.065
Inertinite	3	1.22	0.134
Total:	33	0.69	0.183

Selected categories: Telovitrinite, Detrovitrinite,

No. of readings:	30
Mean of selected categories:	0.63
Standard deviation of selected categories:	0.063

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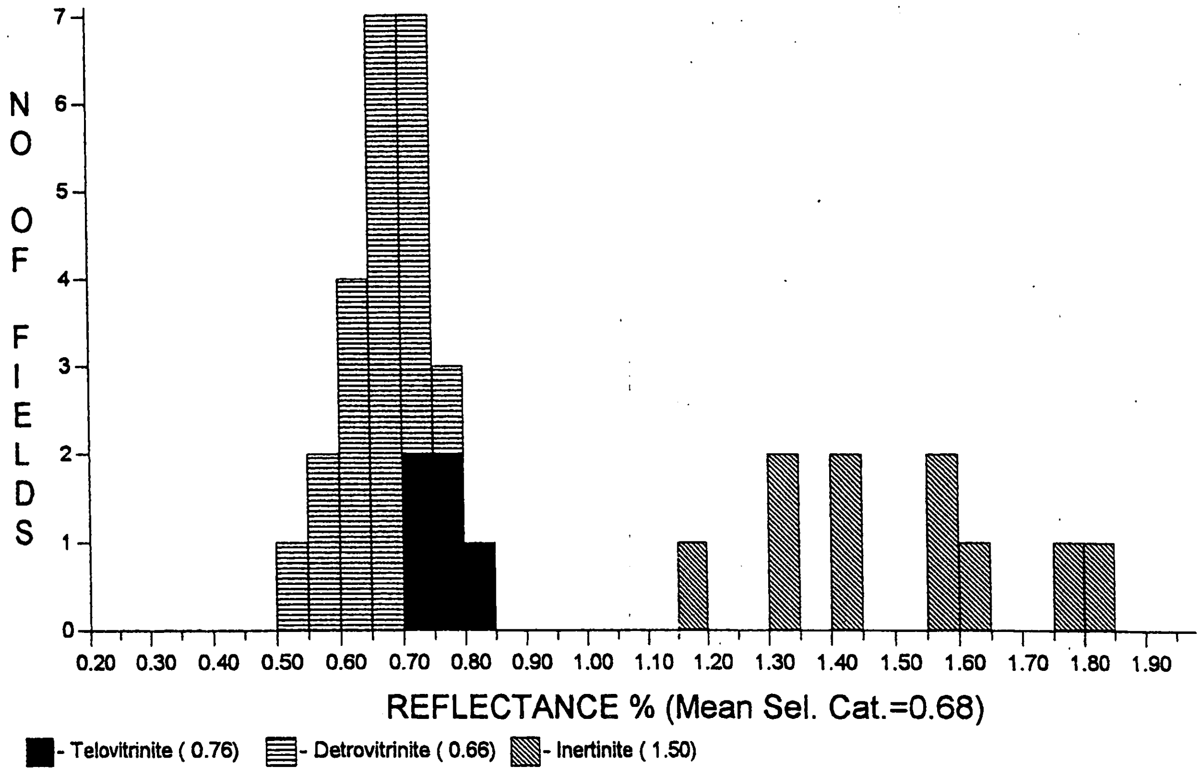
ESSO, E PILCHARD, 2771m, SWC (T8084)



Category	No. of Readings	Mean	Standard Deviation
Telovitrinite	5	0.76	0.030
Detrovitrinite	20	0.66	0.054
Inertinite	10	1.50	0.199
Total:	35	0.91	0.389

Selected categories: Telovitrinite, Detrovitrinite,

No. of readings:	25
Mean of selected categories:	0.68
Standard deviation of selected categories:	0.066

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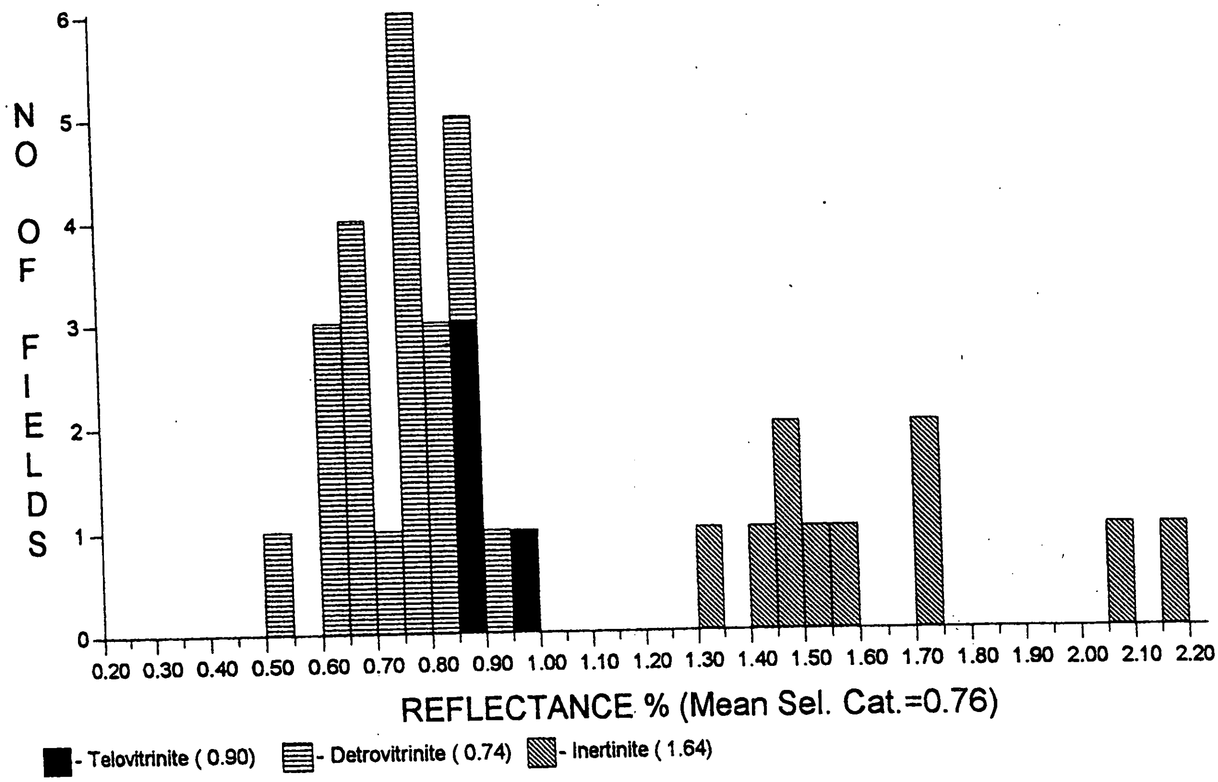
ESSO, E PILCHARD, 2870-2875m, Ctgs (T8085)



Category	No. of Readings	Mean	Standard Deviation
Telovitrinite	4	0.90	0.046
Detrovitrinite	21	0.74	0.099
Inertinite	10	1.64	0.269
Total:	35	1.01	0.434

Selected categories: Telovitrinite, Detrovitrinite,

No. of readings:	25
Mean of selected categories:	0.76
Standard deviation of selected categories:	0.109

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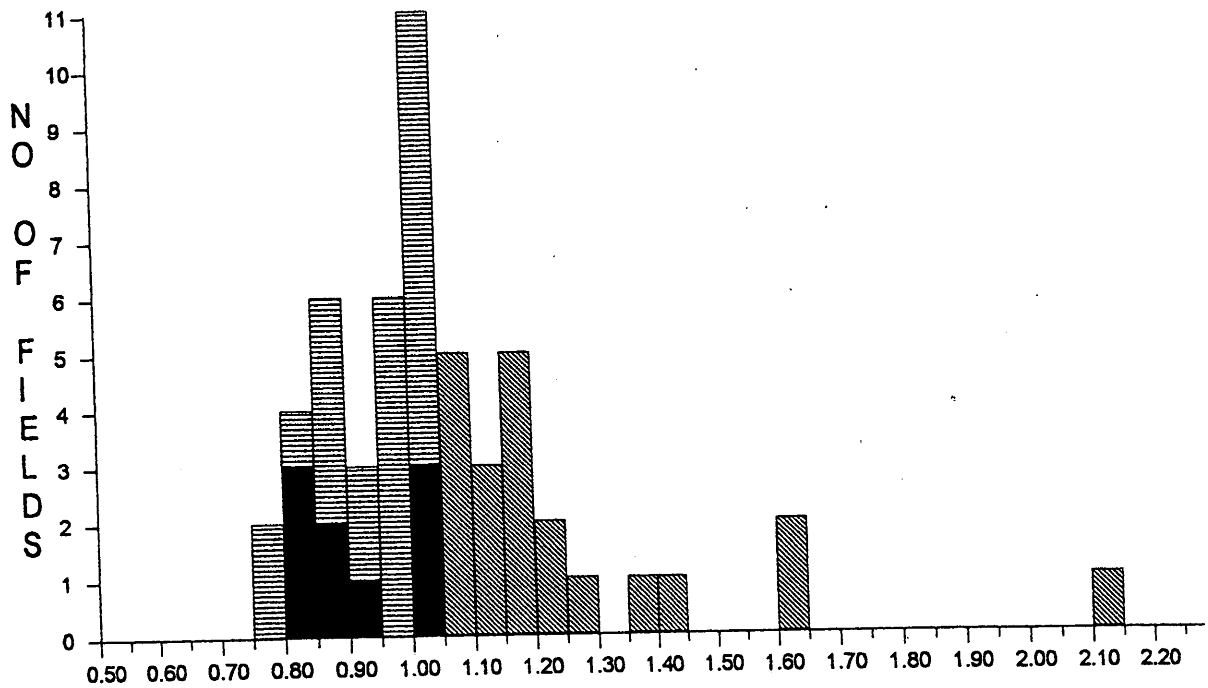
Esso East Pilchard-1, 2997 m, SWC (T8086)



Category	No. of Readings	Mean	Standard Deviation
Telovitrinite	9	0.90	0.084
Detrovitrinite	23	0.94	0.082
Inertinite	21	1.25	0.246
Total:	53	1.06	0.231

Selected categories: Telovitrinite, Detrovitrinite,

No. of readings:	32
Mean of selected categories:	0.93
Standard deviation of selected categories:	0.084

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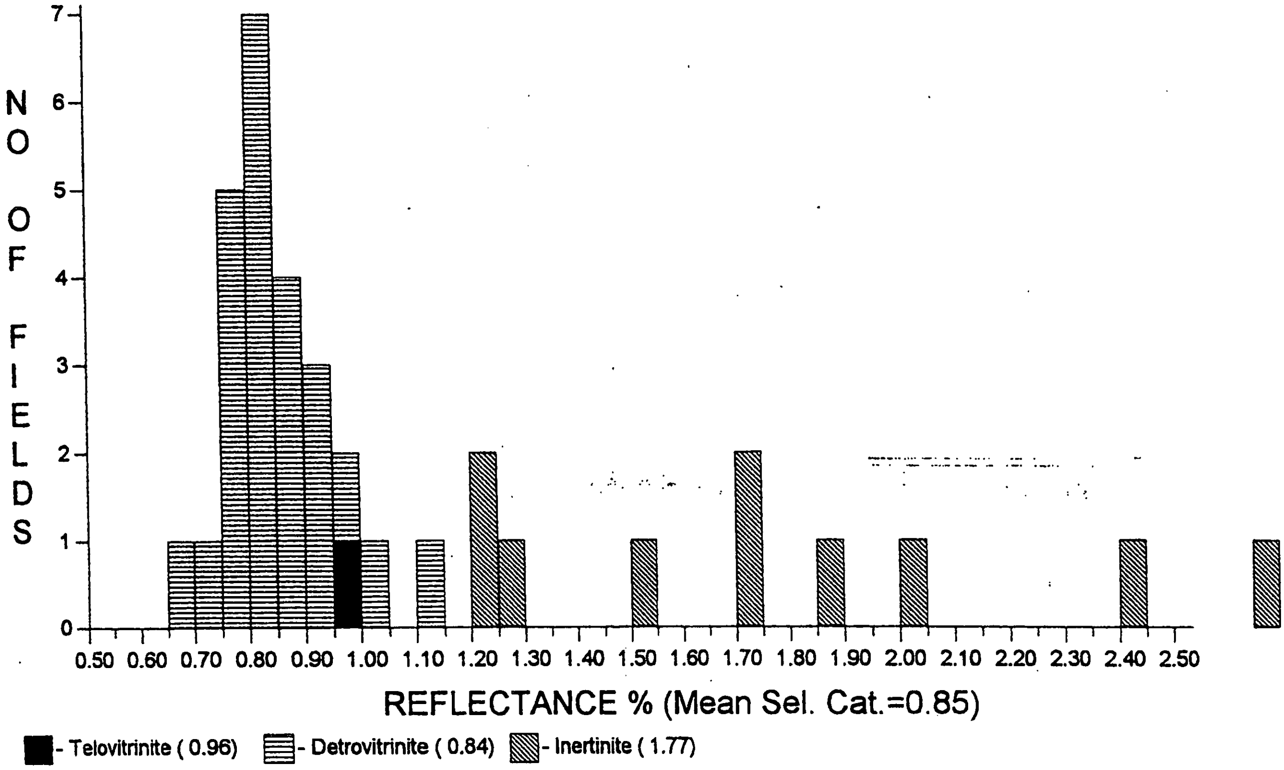
ESSO, E PILCHARD, 3087m, SWC (T8087)



Category	No. of Readings	Mean	Standard Deviation
Telovitrinite	1	0.96	0.000
Detrovitrinite	24	0.84	0.093
Inertinite	10	1.77	0.475
Total:	35	1.11	0.492

Selected categories: Telovitrinite, Detrovitrinite,

No. of readings:	25
Mean of selected categories:	0.85
Standard deviation of selected categories:	0.094

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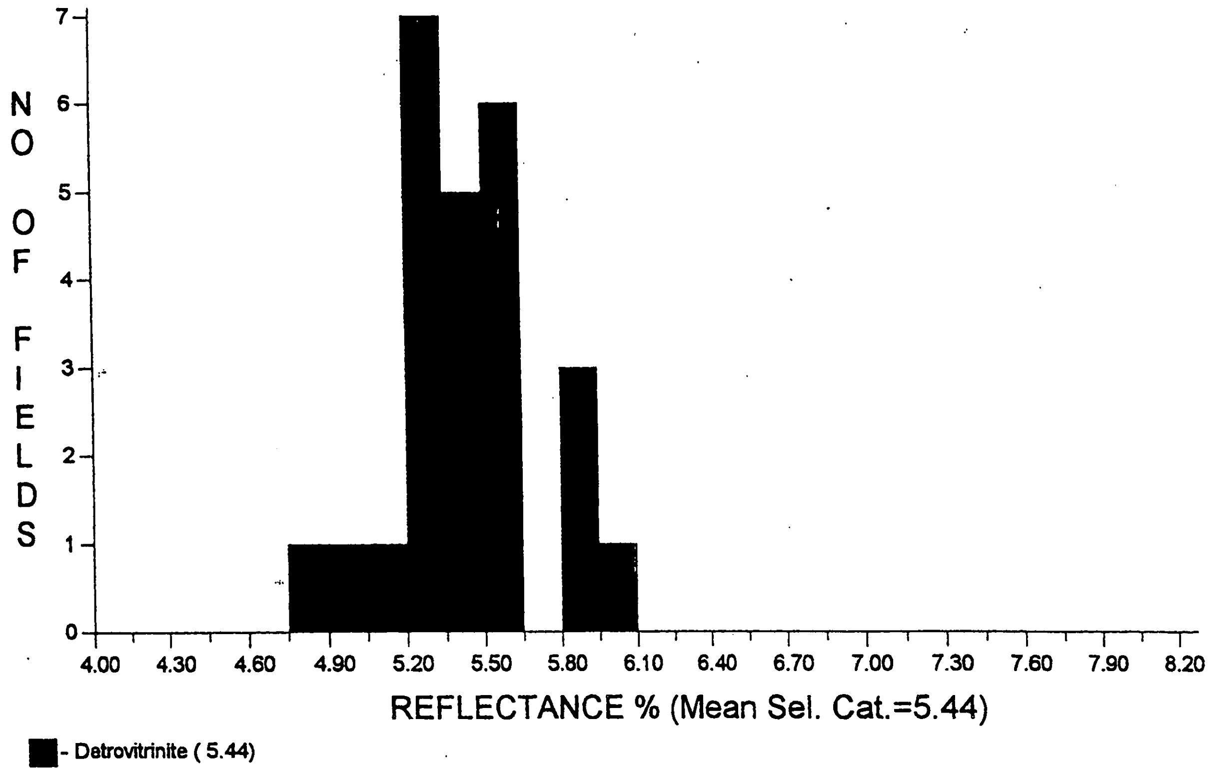
ESSO, E PILCHARD, 3127m, SWC (T8088)



Category	No. of Readings	Mean	Standard Deviation
Detrovitrinite	25	5.44	0.277
Total:	25	5.44	0.277

Selected categories: Detrovitrinite.

No. of readings:	25
Mean of selected categories:	5.44
Standard deviation of selected categories:	0.277

APPENDIX 5

VELOCITY SURVEY REPORT

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Schlumberger

Schlumberger Oilfield Australia Pty Limited
A.C.N. 003 264 597
Level 5, 256 St. George's Tce.
Perth WA 6000
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ESSO Australia

WELL SEISMIC PROCESSING REPORT

VSP

East Pilchard-1

FIELD: Exploration

COUNTRY: Australia

COORDINATES: Latitude: 38 11' 54.184" S
: Longitude: 148 33' 42.825" E

DATE OF VSP SURVEY: 3-AUG-2001

REFERENCE NO: DS 801-007

INTERVAL: 146.5-3137 mRT

Prepared by:
Yuri Solovyov (Schlumberger DCS)

CONTENTS

List of Figures

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VSP PLOTS

1. Introduction

A single run borehole seismic survey was recorded in the vertical well East Pilchard-1 on 3 August, 2001. This survey included both rig source VSP and additional checkshot measurements. The data were acquired using a Dual Combinable Seismic Acquisition Tool (CSAT-B) downhole and a cluster of 3 G-Guns suspended from the rig.

This report describes the techniques used, the parameter choices and presents the results of the checkshot and VSP data processing.

2. Data Acquisition

The data were acquired in one logging run in both open and cased hole, using the three component Dual Combinable Seismic Acquisition Tool (CSAT-B), fitted with GAC accelerometer. A cluster of 3 G-guns with 150 cu in capacity each used as the source, was fired at 1900 psi air pressure. The gun cluster was positioned 5 m below the SRD sea level. Hydrophone was positioned 5 m below the gun. Recording was made on the Schlumberger Maxis 500 Unit using DLIS format.
The VSP levels were acquired from 1546.6 mKB to 3137 mKB with additional checkshot levels from 146.5 mKB to 1475.9 mKB. VSP levels were recorded with 15 m interval.

Table 1. Survey Parameters

Elevation of KB	25 m
Elevation of DF	25 m
Elevation of GL	-91 m
Well Deviation	0 (vertical)
Energy Source	3x150 cu in. G-guns
Source Offset	45 M
Source Depth	5 M below Sea Level
Reference Sensor	Hydrophone
Hydrophone Offset	45 M
Hydrophone Depth	10 M below Sea Level
Source & Hyd. Azimuth	140 Deg.
Tool Type	CSAT-B
Tool Combination	Dual CSAT-B+GR
De-coupled Sensors	Yes
Shaker Fitted	Yes
Number of Axis	3
Sensor Type	GAC – Geophone Accelerometer
Frequency Response (GAC)	3-200 Hz
Sampling Rate	1 ms.
Recording Time	6.0 sec.
Acquisition Unit	MAXIS
Recording Format	DLIS

3. Well Seismic Edit

The data for both VSP and the checkshot intervals were prepared using the same methods.

Each shot of the raw GAC integrated data was evaluated and edited to remove bad traces. The hydrophone data were also evaluated for signature changes and timing shifts.

The good shots at each level were stacked, using a median stacking technique, to increase the signal to noise ratio of the data. The transit time of each trace was re-computed after stacking.

The following subsections describe the main aspects of the well seismic edit phase:

- Data Quality
- Transit Time Measurement
- Stacking

3.1 Data Quality

The data quality is good.

3.2 Transit Time Measurement

The transit time measured, corresponds to a difference between arrivals recorded by surface and downhole sensors. The reference time (zero time) is the physical recording of the source signal by accelerometers on the gun or sensors positioned near the source. In this case, a hydrophone positioned 5 m below the gun was used as the reference. An inflection point tangent first break picking algorithm was used on both the hydrophone and the geophone data , see Attachment 1.

3.3 Stacking

After reordering and selecting the raw shots, a median stack was performed on the vertical component data. In this method of stacking, at each sample time, the amplitudes of the input traces are read and sorted in ascending order. The output is the median amplitude value from this ordering. If an even number of traces are input, the first is dropped and a median calculated. Then the last is dropped and another median found. The final output is the average of these two median values. The surface sensor (hydrophone) breaks are used as the zero time for stacking. The break time of each trace is recomputed after stacking. Z component median stack presented in Figure 2.

4. VSP Processing Chain

The vertical component of the VSP data was processed using the conventional zero offset processing chain. The following subsections describe the main aspects of the processing chain:

Well Seismic Edit:

- load data
- edit bad records
- pick break time
- Z component median stack

Pre processing:

- transit time correction to datum
- spherical divergence correction
- bandpass filter
- trace normalization

VSP Procesing:

- wavefield separation
- waveshaping deconvolution
- corridor stack

4.1 Pre Processing

4.1.1 Transit Time Correction to Datum

Seismic Reference Datum (SRD) is at Mean Sea Level.
The source was positioned 5 meters below sea surface. The reference hydrophone was located 5 meters below the G-Guns cluster, 10 m below sea level. Correction to SRD was calculated using a water layer velocity of 1524 m/s .

4.1.2 Spherical Divergence Correction

To correct the recorded amplitudes for the loss of energy due to spherical divergence, a time varying gain function of the exponential form:

$$Gain(T) = \left(\frac{T}{T_0}\right)^{\alpha}$$

where T is the recorded time, T_0 is the first break time and a = 1.2 was applied.

4.1.3 Bandpass Filter

The effective bandwidth of the recorded data is evaluated by examining the amplitude spectrum of the stacked vertical component presented in Figure 1. Zero phase Butterworth Bandpass filter was applied to the data limiting the bandwidth to 5-120 Hz.

4.1.4 Trace Normalization

Trace equalization was applied by normalizing the RMS amplitude of the first break to correct for transmission losses of the direct wave. A normalization window of 100 milliseconds used.

4.2 VSP Processing

4.2.1 Wavefield Separation

A velocity filter (coherency) technique was used to separate upgoing and downgoing wavefields.

The downgoing coherent compressional energy is estimated using nine levels mean velocity filter parallel to the direct arrival curve. The filter array is moved down one level after each computation and the process is repeated level by level over the entire dataset.
The downgoing wavefield is displayed in one way time (Figure 3).

The residual wavefield is obtained by subtracting the estimated downgoing coherent energy from the total wavefield. The residual wavefield is dominated by reflected compressional events (Figure 4).

4.2.2 Waveshaping Deconvolution

The waveshaping process shortens the seismic pulse within races and for zero phase centers their amplitude peak on the reflector. This improves the resolution of the seismic data and helps to clarify the correlation of the seismic events. It is also applied to collapse the recorded multiples.

The waveshaping deconvolution operator is a double-sided Wiener-Levinson waveshaping filter. The operator is computed for each level of the downgoing wavefield using a design window length of 2 s starting 20 ms before the picked break times in order to include the wavelet precisely. The designed outputs were chosen to be zero phse with a bandwidth of 5-80 Hz. Once the design is made upon the downgoing wavefield, it is applied to the both downgoing and upgoing wavefields at the same level. The upgoing compresional wavefield is then enhanced using 7 level median coherency velocity filter as shown in Figure 5.

The downgoing wavefield is displayed in one way time (Figure 5).

4.2.3 Corridor Stack

A corridor stack was computed on the data after zero phase waveshaping deconvolution by designing a constant 100 ms timing window along the to-way time depth curve and stacking the data onto a single trace. The deepest 7 traces are stacked entirely. The resulting trace under normal circumstances satisfies the assumption of one dimentiality and provides the best seismic representation of borehole. This corridor stack is displayed in Figure 7 along with the enhanced upgoing wavefield in two way time.

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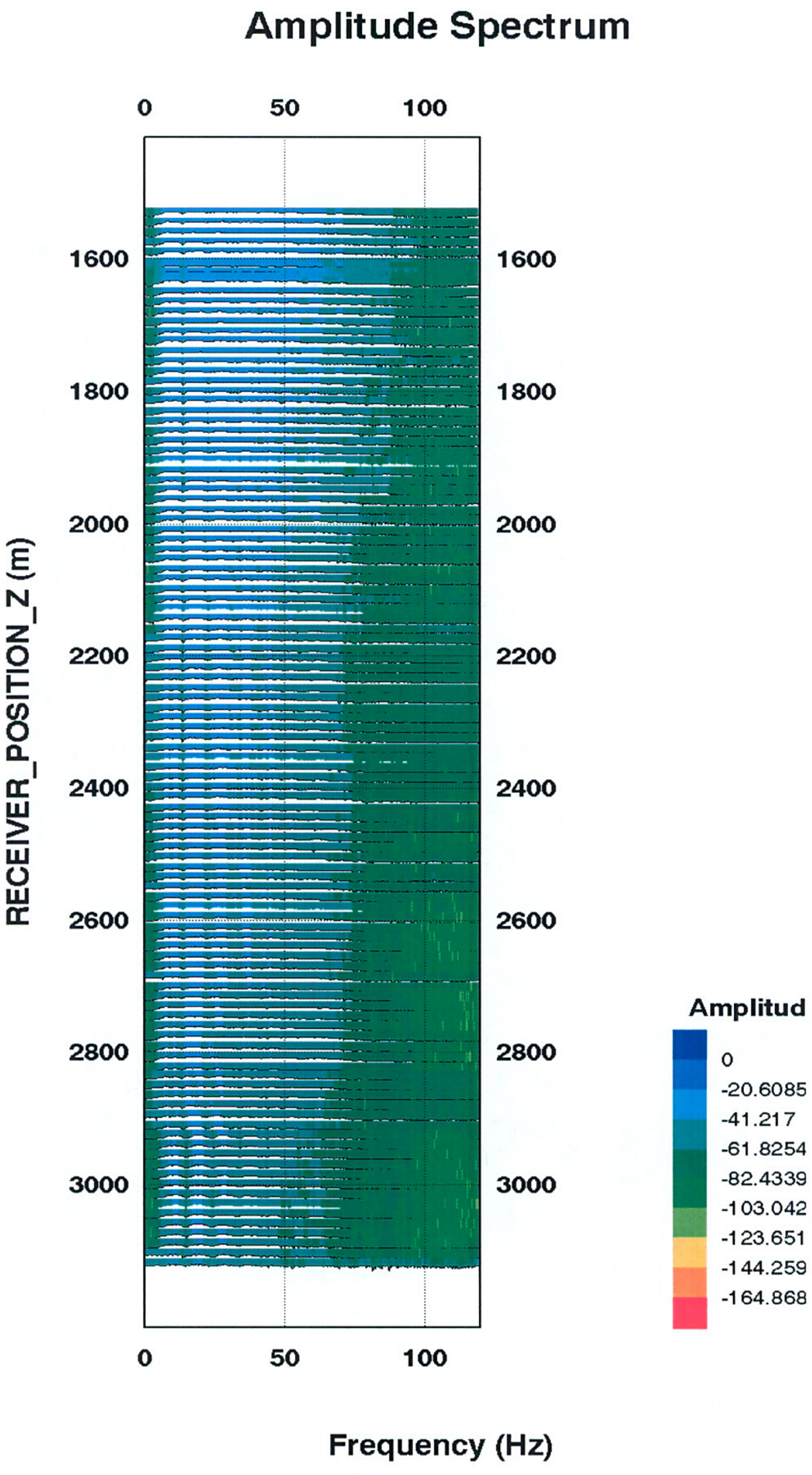

Figure 1. Amplitude Spectrum

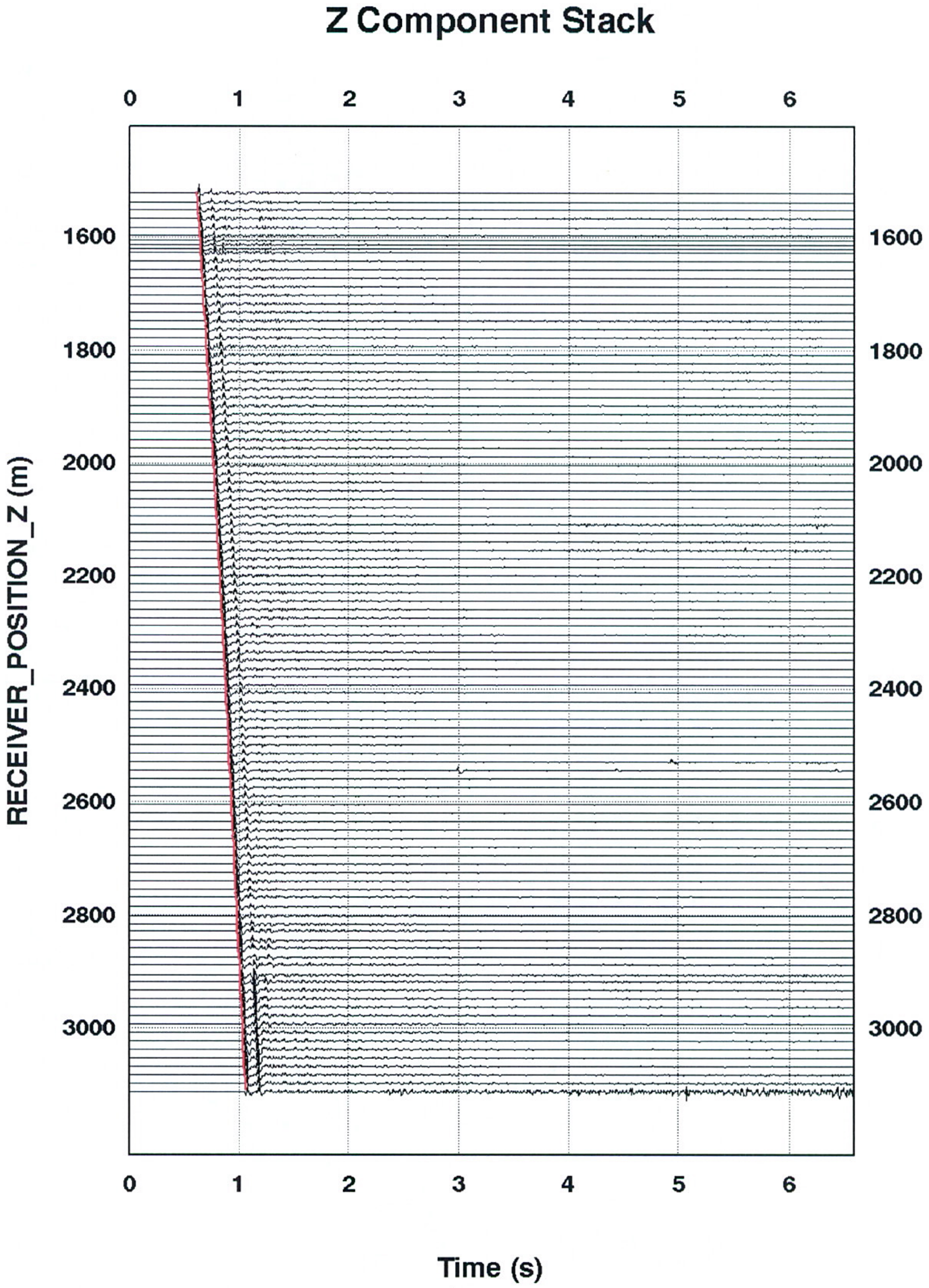

Figure 2. Z Median Stack

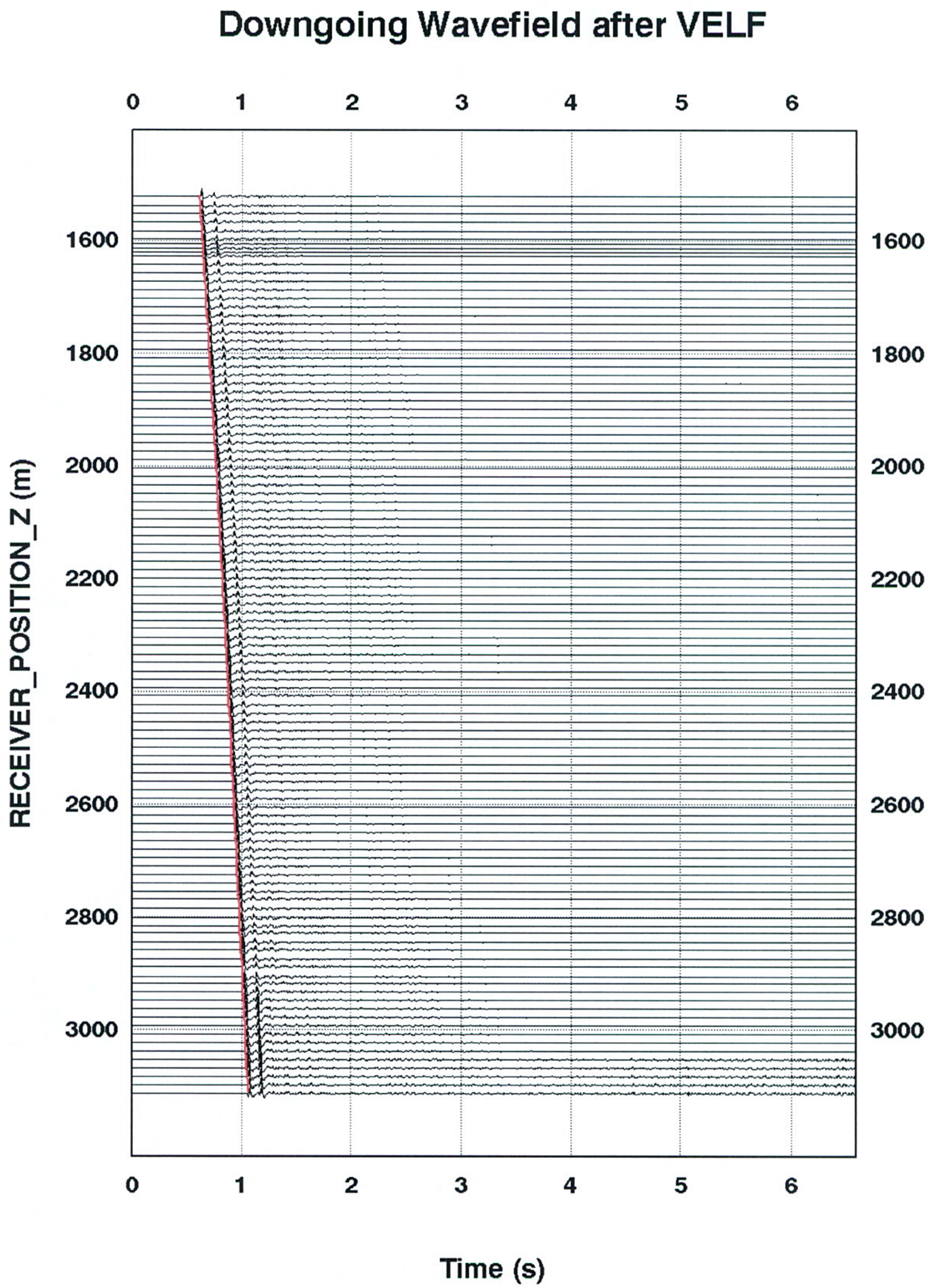

Figure 3. Downgoing Wavefield after VELF

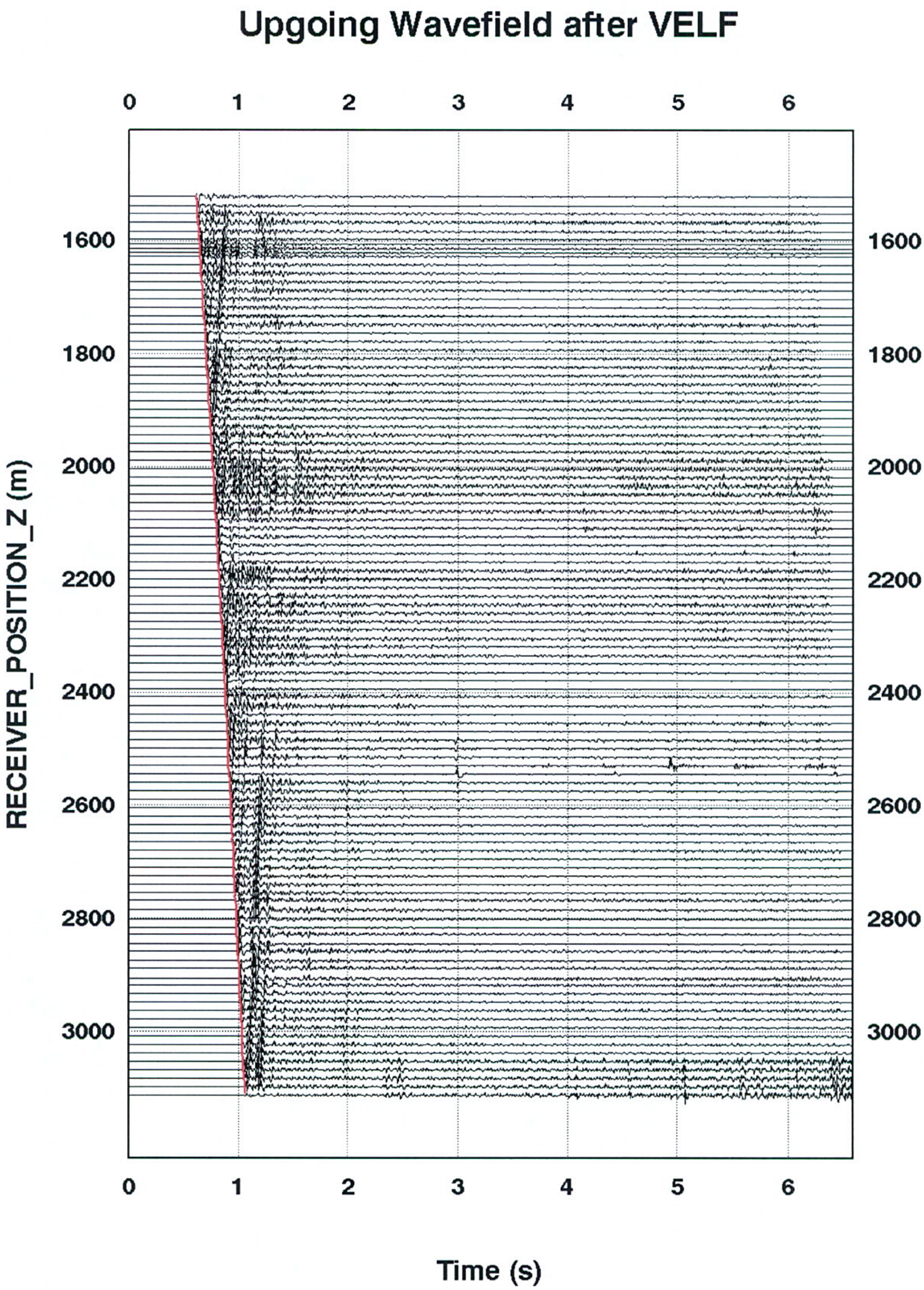

Figure 4. Upgoing Wavefield after VELF

Downgoing Wavefield after WSF

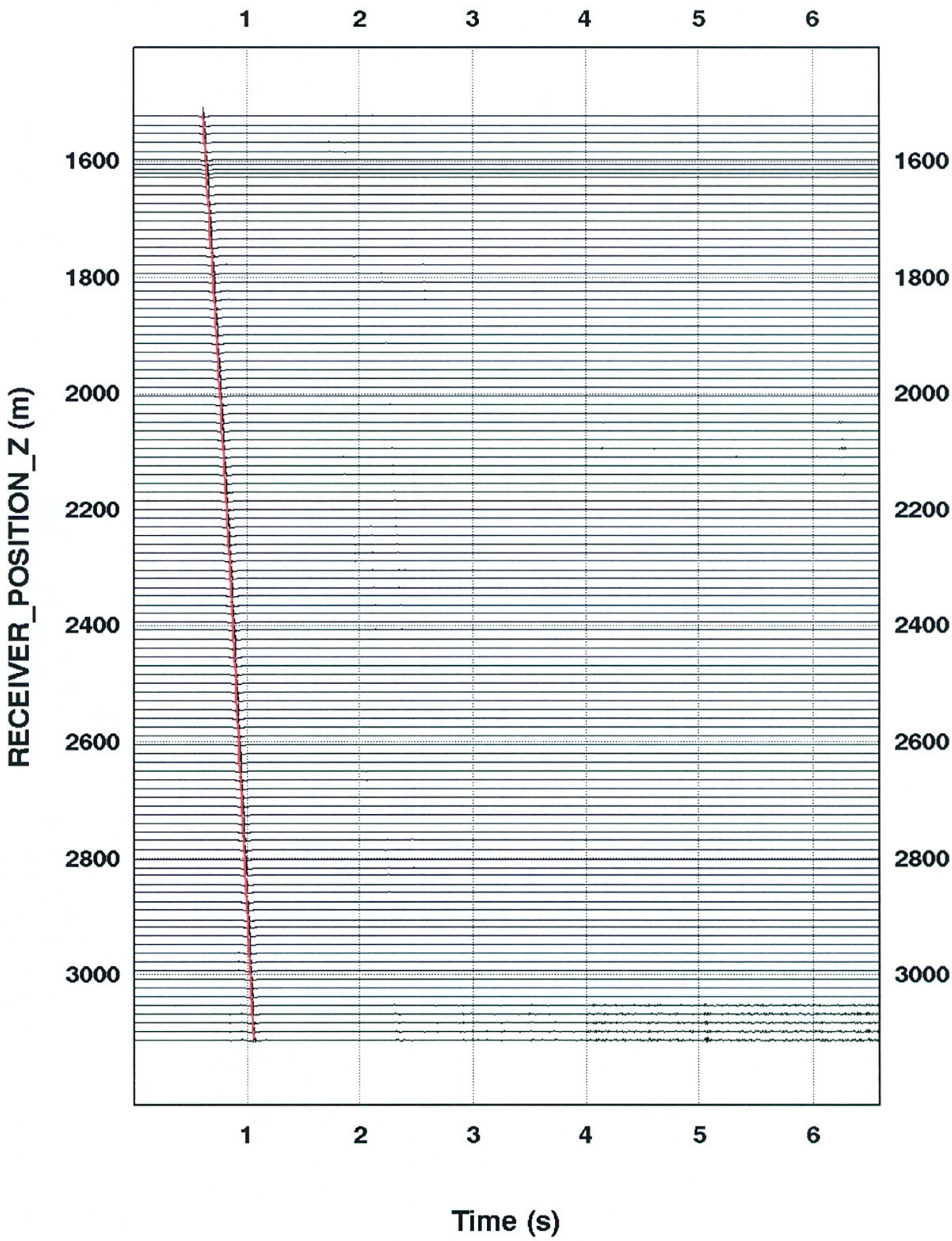

Figure 5. Downgoing Wavefield after WSF

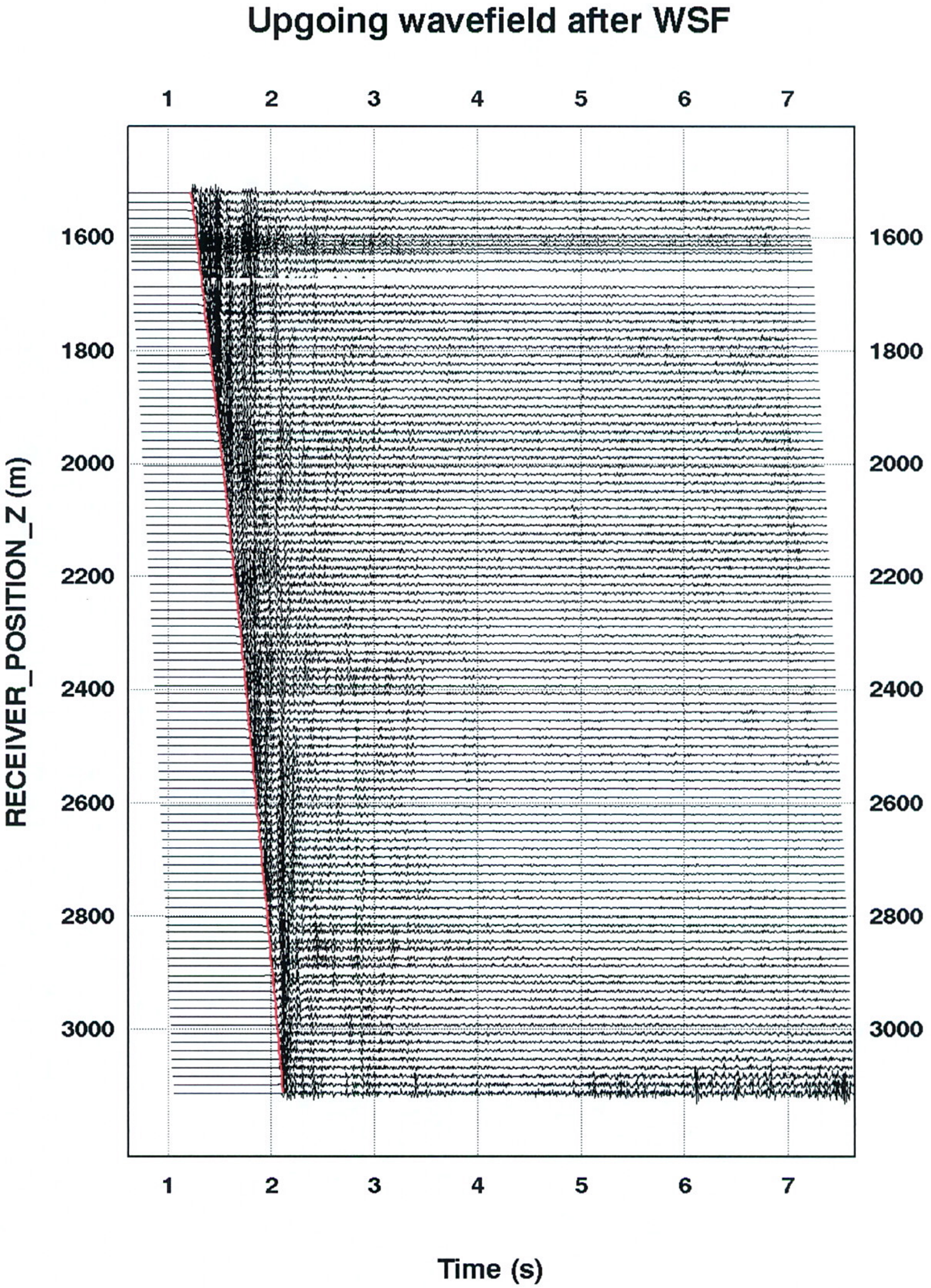

Figure 6. Upgoing Wavefield after WSF

Schlumberger

Vertical Seismic Profile

COMPOSITE DISPLAY

Company: ESSO Australia
Well: East Pilchard-1
Field: Exploration
State: VIC
Country: Australia
SRD: MSL
Job Ref No.: DS 801-007

Source Type: Airgun
Offset: 45 m
Azimuth: 140 deg.

Corridor Stack — 100 ms corridor
Increase in Acoustic Impedance is a Trough

Plot # 1 Composite Display (Normal Polarity)

Processing Steps:

(1) Load Data
(2) Edit Bad Records
(3) Z Component Median Stack
(4) Peak Break Time
(5) Bandpass Filter: 5-120 HZ
(6) Time Varying Gain : (T/T0)1.2
(7) Correction to SRD
(8) Wavefield Separation
(Mean Filter, 9 Levels, 1 Sample)
(9) Waveshaping Deconvolution
(Decon Operator Created by Fitered Unit Impulse, Bandwidth : 5-80 HZ, Filter Length : 2 S)
(10) Upgoing Wavefield Enhancement
(Median Filter, 7 Levels, 1 Sample)
(11) Corridor Stack : 0.1 S Window
(All Traces Except the Deepest 7)

Display Parameters :
Scale: 20 cm/s
Normal Polarity: Increase in Acoustic Impedance is a Trough

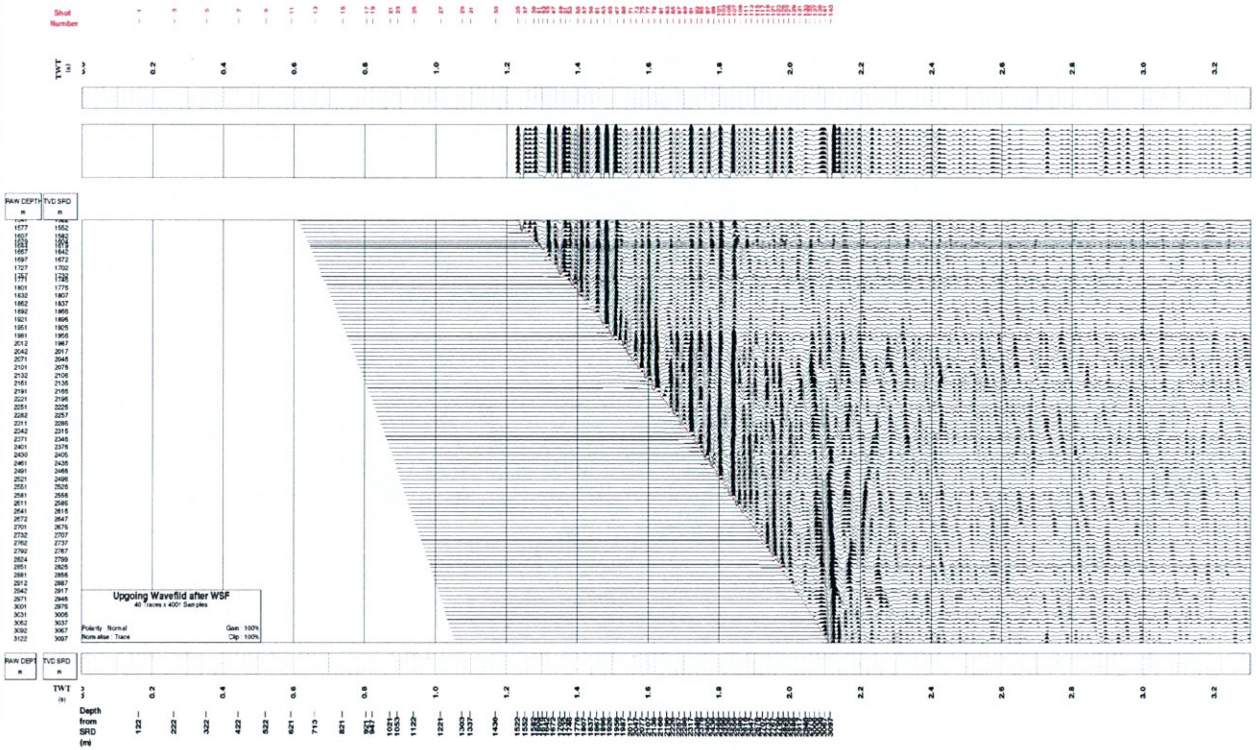

Figure 7. Composite Display

Finally, a velocity crossplot was created, using interval, average and RMS velocities, Figure 8.

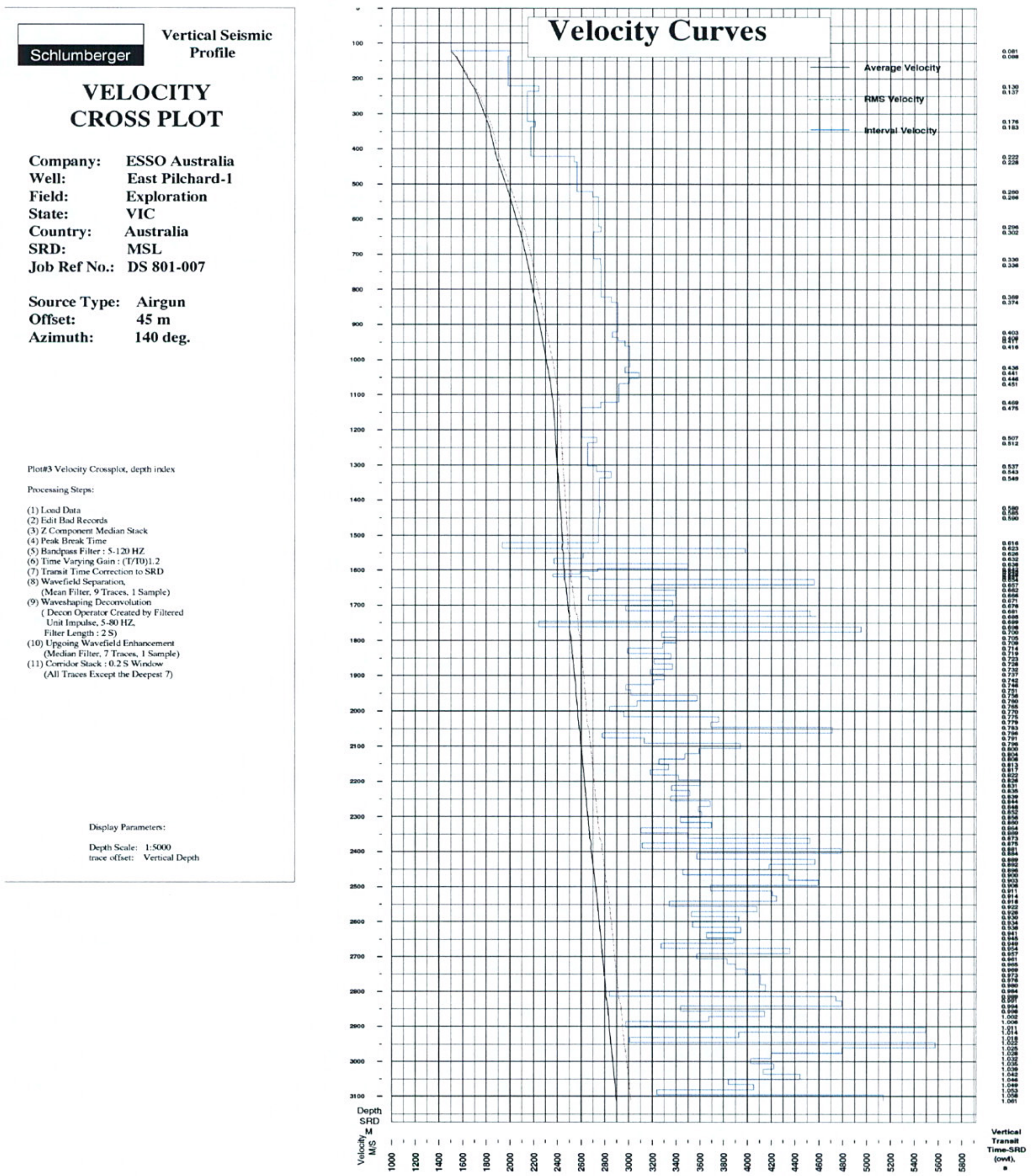

Figure 8. Velocity Crossplot

A Summary of Geophysical Listings

One geophysical data listing is appended to this report. Following is a brief description of the format.

A1 Check Shot Data

1. Level number: the level number starting from the top level (includes any imposed shots).

2. Vertical depth form SRD: *dsrd*, the depth in metres from seismic reference datum.

3. Measured depth from KB: *dkb*, the depth in metres from kelly bushing.

4. Observed travel time HYD to GEO: *tim0*, the transit time picked form the stacked data by subtracting the surface sensor first break time from the downhole sensor first break time.

5. Vertical travel time SRD to GEO: *shtm*, is *timv* – vertical time, corrected for the vertical distance between source and datum.

6. Delta depth between shots: Δ*depth*, the vertical distance between each level.

7. Delta time between shots: Δ*time*, the difference in vertical travel time (*shtm*),between each level.

8. Interval velocity between shots: the average seismic velocity between each level, Δ*depth*/Δ*time*

9. Average velocity SRD to GEO: the average seismic velocity from datum to the corresponding checkshot level, shtm dsrd .

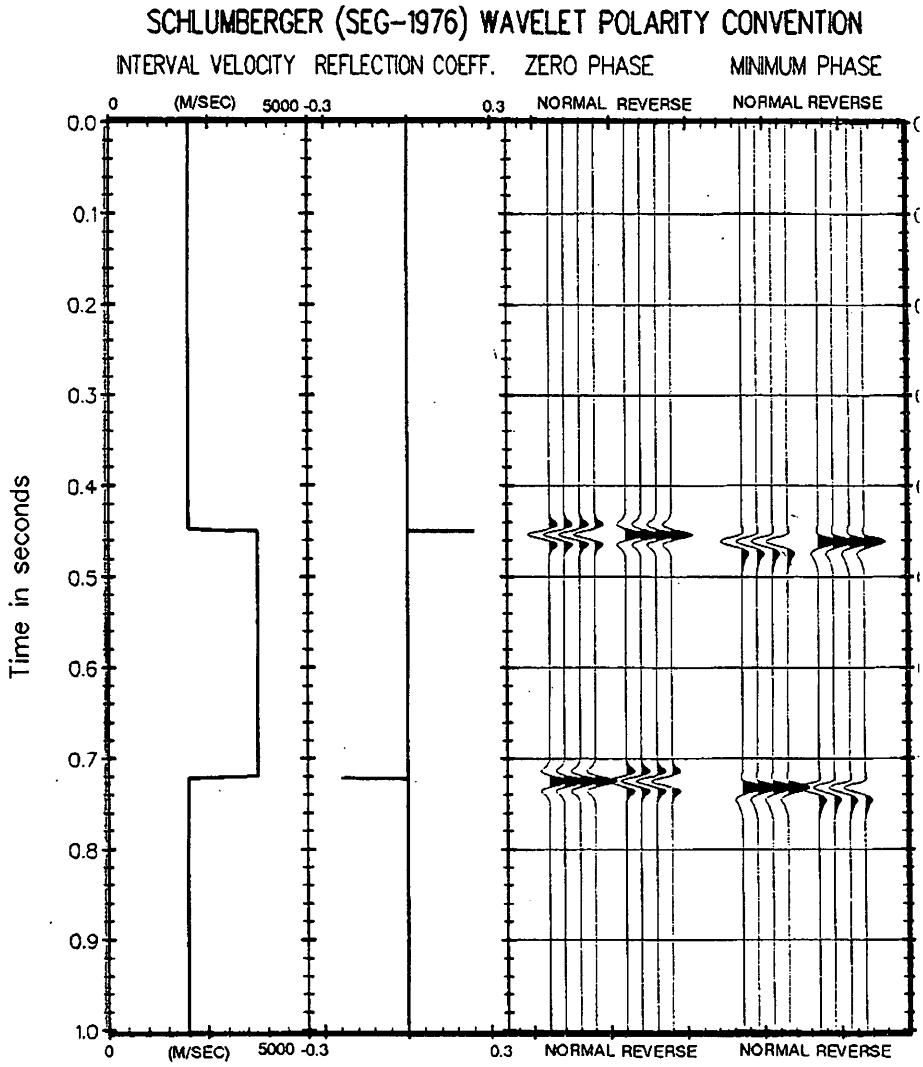

Figure 9. Schlumberger Wavelet Polarity Convention

Client and Well Information

Country	**AUSTRALIA**
State	**VICTORIA**
Logging Date	**3-Aug-2001**
Company	**ESSO AUSTRALIA**
Field	**WILDCAT EXPLORATION**
Well	**EAST PILCHARD-1**

Check Shot Data (Continued)

LEVEL NUMBER	VERTICAL DEPTH FROM SRD m	MEASURED DEPTH FROM KB m	OBSERVED TRAVEL TIME (owt) s	Vertical Transit Time-SRD (owt) s	DELTA DEPTH m	DELTA TIME s	SEISMIC INTERVAL VELOCITY m/s	SEISMIC AVERAGE VELOCITY m/s
1	0.0			0.0000				
							1524	
2	121.5	146.5	0.0795	0.0805				1524
					15.4	0.0076	2021	
3	136.9	161.9	0.0864	0.0882				1553
					84.6	0.0423	2002	
4	221.5	246.5	0.1266	0.1304				1698
					15.4	0.0068	2265	
5	236.9	261.9	0.1332	0.1372				1726
					84.6	0.0391	2165	
6	321.5	346.5	0.1715	0.1763				1824
					15.5	0.0069	2234	
7	337.0	362.0	0.1783	0.1832				1839
					84.6	0.0385	2196	
8	421.6	446.6	0.2165	0.2218				1901
					15.4	0.0060	2571	
9	437.0	462.0	0.2224	0.2278				1919
					84.5	0.0326	2593	
10	521.5	546.5	0.2548	0.2603				2003
					15.5	0.0057	2724	
11	537.0	562.0	0.2604	0.2660				2019
					84.5	0.0304	2775	
12	621.5	646.5	0.2907	0.2965				2096
					15.3	0.0055	2797	
13	636.8	661.8	0.2961	0.3019				2109
					76.7	0.0281	2734	
14	713.5	738.5	0.3241	0.3300				2162
					15.5	0.0055	2793	
15	729.0	754.0	0.3296	0.3356				2173
					92.5	0.0331	2797	
16	821.5	846.5	0.3626	0.3686				2229
					15.3	0.0053	2887	
17	836.8	861.8	0.3679	0.3739				2238
					84.7	0.0288	2943	

18	921.5	946.5	0.3966	0.4027				2288
					15.4	0.0053	2896	
19	936.9	961.9	0.4019	0.4080				2296
					9.7	0.0033	2945	
20	946.6	971.6	0.4052	0.4113				2301
					15.4	0.0051	3003	
21	962.0	987.0	0.4103	0.4164				2310
					59.5	0.0195	3046	
22	1021.5	1046.5	0.4298	0.4360				2343
					15.4	0.0051	3005	
23	1036.9	1061.9	0.4350	0.4411				2351
					16.5	0.0053	3123	
24	1053.4	1078.4	0.4402	0.4464				2360
					15.4	0.0051	3040	
25	1068.8	1093.8	0.4453	0.4514				2368
					52.8	0.0179	2950	
26	1121.6	1146.6	0.4632	0.4693				2390
					15.4	0.0055	2796	
27	1137.0	1162.0	0.4687	0.4749				2394
					84.5	0.0321	2636	
28	1221.5	1246.5	0.5007	0.5069				2410
					15.4	0.0056	2762	
29	1236.9	1261.9	0.5063	0.5125				2414
					66.5	0.0248	2684	
30	1303.4	1328.4	0.5310	0.5373				2426
					15.4	0.0056	2760	
31	1318.8	1343.8	0.5366	0.5429				2429
					18.1	0.0063	2886	
32	1336.9	1361.9	0.5429	0.5491				2435
					84.6	0.0304	2783	
33	1421.5	1446.5	0.5732	0.5795				2453
					14.0	0.0050	2788	
34	1435.5	1460.5	0.5783	0.5845				2456
					15.4	0.0055	2783	
35	1450.9	1475.9	0.5838	0.5901				2459
					70.7	0.0255	2777	
36	1521.6	1546.6	0.6092	0.6155				2472
					15.5	0.0079	1952	
37	1537.1	1562.1	0.6172	0.6235				2465
					14.5	0.0025	4031	
38	1551.6	1576.6	0.6197	0.6260				2479
					15.0	0.0057	2646	
39	1566.6	1591.6	0.6254	0.6317				2480
					15.4	0.0064	2397	
40	1582.0	1607.0	0.6318	0.6381				2479
					14.5	0.0041	3543	
41	1596.5	1621.5	0.6359	0.6422				2486
					7.1	0.0026	2771	
42	1603.6	1628.6	0.6385	0.6448				2487
					8.3	0.0032	2617	
43	1611.9	1636.9	0.6416	0.6479				2488
					7.1	0.0030	2383	
44	1619.0	1644.0	0.6446	0.6509				2487
					7.4	0.0027	2697	
45	1626.4	1651.4	0.6473	0.6537				2488
					15.5	0.0034	4621	
46	1641.9	1666.9	0.6507	0.6570				2499

					14.5	0.0045	3229	
47	1656.4	1681.4	0.6552	0.6615				2504
					15.4	0.0045	3437	
48	1671.8	1696.8	0.6597	0.6660				2510
					14.7	0.0055	2690	
49	1686.5	1711.5	0.6651	0.6714				2512
					15.4	0.0045	3410	
50	1701.9	1726.9	0.6696	0.6760				2518
					14.4	0.0048	3010	
51	1716.3	1741.3	0.6744	0.6807				2521
					15.3	0.0022	4585	
52	1731.6	1756.6	0.6766	0.6829				2536
					0.1	0.0022	4638	
53	1731.7	1756.7	0.6788	0.6851				2527
					14.6	0.0042	3424	
54	1746.3	1771.3	0.6830	0.6893				2533
					15.5	0.0082	2264	
55	1761.8	1786.8	0.6912	0.6976				2526
					14.7	0.0029	5017	
56	1776.5	1801.5	0.6942	0.7005				2536
					15.4	0.0046	3314	
57	1791.9	1816.9	0.6988	0.7051				2541
					14.7	0.0043	3444	
58	1806.6	1831.6	0.7031	0.7094				2547
					15.5	0.0047	3327	
59	1822.1	1847.1	0.7077	0.7141				2552
					14.5	0.0048	3026	
60	1836.6	1861.6	0.7125	0.7189				2555
					15.4	0.0045	3397	
61	1852.0	1877.0	0.7170	0.7234				2560
					14.5	0.0045	3255	
62	1866.5	1891.5	0.7215	0.7278				2564
					15.4	0.0045	3410	
63	1881.9	1906.9	0.7260	0.7324				2570
					14.5	0.0045	3220	
64	1896.4	1921.4	0.7305	0.7369				2574
					15.5	0.0046	3340	
65	1911.9	1936.9	0.7352	0.7415				2578
					14.5	0.0045	3248	
66	1926.4	1951.4	0.7396	0.7460				2582
					15.4	0.0051	3010	
67	1941.8	1966.8	0.7447	0.7511				2585
					14.6	0.0048	3053	
68	1956.4	1981.4	0.7495	0.7559				2588
					15.4	0.0043	3620	
69	1971.8	1996.8	0.7538	0.7601				2594
					14.8	0.0048	3107	
70	1986.6	2011.6	0.7585	0.7649				2597
					15.4	0.0054	2870	
71	2002.0	2027.0	0.7639	0.7703				2599
					14.6	0.0049	2992	
72	2016.6	2041.6	0.7688	0.7751				2602
					15.4	0.0040	3804	
73	2032.0	2057.0	0.7728	0.7792				2608
					14.5	0.0039	3736	
74	2046.5	2071.5	0.7767	0.7831				2613
					15.4	0.0032	4772	

75	2061.9	2086.9	0.7799	0.7863				2622
					14.6	0.0052	2810	
76	2076.5	2101.5	0.7851	0.7915				2624
					15.4	0.0049	3167	
77	2091.9	2116.9	0.7900	0.7963				2627
					14.6	0.0037	3990	
78	2106.5	2131.5	0.7936	0.8000				2633
					15.4	0.0042	3637	
79	2121.9	2146.9	0.7979	0.8042				2638
					14.2	0.0040	3515	
80	2136.1	2161.1	0.8019	0.8083				2643
					15.5	0.0047	3294	
81	2151.6	2176.6	0.8066	0.8130				2647
					14.7	0.0044	3376	
82	2166.3	2191.3	0.8110	0.8173				2650
					15.4	0.0048	3220	
83	2181.7	2206.7	0.8157	0.8221				2654
					14.6	0.0042	3460	
84	2196.3	2221.3	0.8200	0.8263				2658
					15.5	0.0042	3648	
85	2211.8	2236.8	0.8242	0.8306				2663
					14.6	0.0043	3399	
86	2226.4	2251.4	0.8285	0.8349				2667
					15.4	0.0043	3561	
87	2241.8	2266.8	0.8328	0.8392				2671
					14.8	0.0044	3392	
88	2256.6	2281.6	0.8372	0.8436				2675
					15.4	0.0041	3731	
89	2272.0	2297.0	0.8413	0.8477				2680
					14.4	0.0040	3632	
90	2286.4	2311.4	0.8453	0.8517				2685
					15.4	0.0042	3657	
91	2301.8	2326.8	0.8495	0.8559				2689
					14.7	0.0042	3476	
92	2316.5	2341.5	0.8537	0.8601				2693
					15.5	0.0041	3743	
93	2332.0	2357.0	0.8578	0.8642				2698
					14.3	0.0046	3139	
94	2346.3	2371.3	0.8624	0.8688				2701
					15.4	0.0044	3539	
95	2361.7	2386.7	0.8668	0.8732				2705
					14.6	0.0018	4585	
96	2376.3	2401.3	0.8686	0.8750				2716
					15.4	0.0064	3150	
97	2391.7	2416.7	0.8750	0.8814				2714
					13.3	0.0027	4847	
98	2405.0	2430.0	0.8777	0.8841				2720
					16.7	0.0046	3617	
99	2421.7	2446.7	0.8824	0.8888				2725
					14.6	0.0032	4627	
100	2436.3	2461.3	0.8855	0.8919				2732
					15.4	0.0036	4235	
101	2451.7	2476.7	0.8891	0.8956				2738
					14.6	0.0042	3497	
102	2466.3	2491.3	0.8933	0.8997				2741
					15.4	0.0035	4401	
103	2481.7	2506.7	0.8968	0.9032				2748

					14.7	0.0032	4654	
104	2496.4	2521.4	0.9000	0.9064				2754
					15.4	0.0041	3735	
105	2511.8	2536.8	0.9041	0.9105				2759
					14.6	0.0034	4262	
106	2526.4	2551.4	0.9075	0.9139				2764
					15.4	0.0036	4299	
107	2541.8	2566.8	0.9111	0.9175				2770
					14.6	0.0043	3382	
108	2556.4	2581.4	0.9154	0.9218				2773
					15.4	0.0037	4132	
109	2571.8	2596.8	0.9191	0.9256				2779
					14.6	0.0041	3570	
110	2586.4	2611.4	0.9232	0.9297				2782
					15.4	0.0039	3978	
111	2601.8	2626.8	0.9271	0.9335				2787
					14.7	0.0041	3581	
112	2616.5	2641.5	0.9312	0.9376				2791
					15.4	0.0039	3991	
113	2631.9	2656.9	0.9351	0.9415				2795
					14.7	0.0040	3703	
114	2646.6	2671.6	0.9390	0.9455				2799
					15.4	0.0039	3934	
115	2662.0	2687.0	0.9429	0.9494				2804
					14.5	0.0044	3312	
116	2676.5	2701.5	0.9473	0.9538				2806
					15.4	0.0035	4413	
117	2691.9	2716.9	0.9508	0.9572				2812
					14.7	0.0041	3618	
118	2706.6	2731.6	0.9549	0.9613				2816
					15.4	0.0040	3874	
119	2722.0	2747.0	0.9588	0.9653				2820
					14.6	0.0037	3953	
120	2736.6	2761.6	0.9625	0.9690				2824
					15.4	0.0038	4035	
121	2752.0	2777.0	0.9664	0.9728				2829
					14.6	0.0035	4159	
122	2766.6	2791.6	0.9699	0.9763				2834
					15.4	0.0037	4161	
123	2782.0	2807.0	0.9736	0.9800				2839
					16.6	0.0039	4204	
124	2798.6	2823.6	0.9775	0.9839				2844
					15.4	0.0054	2870	
125	2814.0	2839.0	0.9829	0.9893				2844
					12.5	0.0018	4805	
126	2826.5	2851.5	0.9847	0.9911				2852
					15.5	0.0027	4856	
127	2842.0	2867.0	0.9874	0.9939				2859
					14.5	0.0042	3480	
128	2856.5	2881.5	0.9916	0.9981				2862
					15.5	0.0037	4196	
129	2872.0	2897.0	0.9953	1.0017				2867
					14.5	0.0039	3720	
130	2886.5	2911.5	0.9992	1.0056				2870
					16.9	0.0056	3009	
131	2903.4	2928.4	1.0048	1.0113				2871
					13.2	0.0024	5571	

132	2916.6	2941.6	1.0072	1.0136				2877
					15.4	0.0039	3977	
133	2932.0	2957.0	1.0111	1.0175				2882
					14.4	0.0047	3044	
134	2946.4	2971.4	1.0158	1.0222				2882
					15.5	0.0027	5650	
135	2961.9	2986.9	1.0185	1.0250				2890
					14.6	0.0030	4856	
136	2976.5	3001.5	1.0215	1.0280				2895
					15.5	0.0036	4252	
137	2992.0	3017.0	1.0252	1.0316				2900
					14.5	0.0036	4077	
138	3006.5	3031.5	1.0287	1.0352				2904
					15.5	0.0036	4276	
139	3022.0	3047.0	1.0324	1.0388				2909
					14.5	0.0035	4186	
140	3036.5	3061.5	1.0358	1.0423				2913
					15.5	0.0034	4498	
141	3052.0	3077.0	1.0393	1.0457				2919
					14.6	0.0038	3888	
142	3066.6	3091.6	1.0430	1.0495				2922
					15.4	0.0038	4103	
143	3082.0	3107.0	1.0468	1.0532				2926
					14.6	0.0045	3276	
144	3096.6	3121.6	1.0512	1.0577				2928
					15.4	0.0030	5211	
145	3112.0	3137.0	1.0542	1.0606				2934

Attachment 1. Transit Time Picking Algorithms

The time picking can be broken down into several tasks:

First of all focus on the relevant parts of a data trace by selecting time intervals in form of constraints. To this end the user can select velocity, time header and/or initial guess constraints.

Detect a signal or a first break using a detection algorithm.

Tune on a particular phase of the event (e.g. zero-crossing, peak, trough, etc). It should be clear that tuning is only happening if a pick was either detected by an algorithm or retrieved from a header as initial guess.

Despike the picked transit time curve in order to eliminate mispicks either by median filtering or by cross-correlation. The cross-correlation option does not only have filtering features but also allows to pick correlated events within a section after having picked only one event.

Detection algorithm

Energy break: the algorithm determines the maximum of the so-called energy function, which is the integrated signal energy within a sliding time window normalized by the total energy accumulated since the first time of data.

For a trace S(t) an energy function F(`) is calculated with algorithm proposed by (Coppens, 1985)

Geophone break: finds the first break of a downhole sensor. The algorithm compares amplitudes and slopes in consecutive arches. Input parameters are the center frequency of the data to be picked, a linear fit gate time which should be about half a wavelet period, and a detection threshold between 0.0
and 0.5.

Hydrophone break: provides the first break of a downhole sensor. The routine finds the global minimum and maximum amplitude along a trace, takes the smaller one of the corresponding sample indices and outputs the time of the preceding zero-crossing as the first break. The zero-crossing time is determined by linear regression over a selected length (linear fit gate time).

Tuning:

Peak: finds the time of the closest local maximum amplitude in the vicinity of an input break time.

Trough: finds the time of closest local minimum amplitude in the vicinity of an input break time.

Zero-crossing: finds the time of the closest zero-crossing in the vicinity of an input break time. The routine stores the sign of the derivative at the zero-crossing which can be passed on for the tuning of the following trace. Thus artifacts created by cycle skipping can be reduced.

Inflection: finds the time of the closest inflection point in the vicinity of an input break time. The routine stores the sign of the derivative at the inflection point which can be passed on for the tuning of the following trace. Thus artifacts created by cycle skipping can be reduced.

Inflection point tangent: finds the time of the closest inflection point in the vicinity of an input break time. The tuned break time is the zero-crossing time of the corresponding tangent at this inflection point. The routine stores the sign of the derivative at the inflection point which can be passed on for the tuning of the following trace. Thus artifacts created by cycle skipping can be reduced.

Cross-correlation

This option allows to tune transit times by considering the picked phase of a selected reference trace. The cross-correlation gate in time or length units can be specified in the Motif parameter panel of this option. The default value for the gate is three times the estimated center frequency of the first five traces of the seismic section to be picked. The window is put symmetrically around the transit times of the two traces to be cross-correlated if the option Use Existing Picks for the Gate Center Time is enabled and the transit times are not absent.

If the option Use Existing Picks for the Gate Center Time is disabled then the cross-correlation is started with the ambient traces around the reference trace. Those two traces, in turn, will be taken to set the time gates for the following ones, and so on. Thus an automatic picking can be provided after having picked only the reference trace.

Retuning can be selected to follow the cross-correlation. In this case the cross-correlation serves as a transit time curve despiker.

The cross correlation process can be stopped automatically if the picking quality degrades. This happens if the time difference between the break of the current and the previous trace exceeds a threshold value derived from a user-specified apparent velocity.

A polynomial amplitude interpolation is proposed in order provide "real" extreme values instead of extreme values at the nearest sample. The algorithm works as follows: the global extreme values are detected with the gate together with the corresponding sample indices. A minimum and maximum amplitude tuning provides an exact time estimate of these amplitudes. Polynomial interpolation determines the amplitudes at these times which generally fall in between samples.

There are a variety of selectable and non-exclusive constraints available in order to stabilize the time picking process . The objective is to extract only the relevant part of the trace for the detection, tuning and/or cross-correlation process using.

Reference:

Coppens, F., 1985, First arrival picking on common offset trace collections for automatic estimation of static corrections, Geophys. Prosp. 33, 1212-1231.

Lee, D. and Morf, M., 1980, A novel innovations based time –domain pitch detection.

PE607399

This is an enclosure indicator page.
The enclosure PE607399 is enclosed within the container PE908923 at this location in this document.

The enclosure PE607399 has the following characteristics:

ITEM_BARCODE = PE607399
CONTAINER_BARCODE = PE908923
NAME = East Pilchard-1 VSP Log Print
BASIN = GIPPSLAND
ONSHORE? = N
DATA_TYPE = WELL
DATA_SUB_TYPE = SYNTH_SEISMOGRAM
DESCRIPTION = East Pilchard-1 Composite Display Vertical Seismic Profile Normal Polarity Plot 1 of Appendix 5: Vertical Survey Report
REMARKS =
DATE_WRITTEN =
DATE_PROCESSED =
DATE_RECEIVED = 13-FEB-2002
RECEIVED_FROM = Esso Australia Pty Ltd
WELL_NAME = East Pilchard-1
CONTRACTOR = Schlumberger
AUTHOR =
ORIGINATOR = Esso Australia Resources Ltd.
TOP_DEPTH =
BOTTOM_DEPTH =
ROW_CREATED_BY = DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

PE607400

This is an enclosure indicator page.
The enclosure PE607400 is enclosed within the container PE908923 at this location in this document.

The enclosure PE607400 has the following characteristics:

ITEM_BARCODE =	PE607400
CONTAINER_BARCODE =	PE908923
NAME =	East Pilchard-1 VSP Log Print
BASIN =	GIPPSLAND
ONSHORE? =	N
DATA_TYPE =	WELL
DATA_SUB_TYPE =	SYNTH_SEISMOGRAM
DESCRIPTION =	East Pilchard-1 Composite Display Vertical Seismic Profile Reversed Polarity Plot 2 of Appendix 5: Vertical Survey Report
REMARKS =	
DATE_WRITTEN =	
DATE_PROCESSED =	
DATE_RECEIVED =	13-FEB-2002
RECEIVED_FROM =	Esso Australia Pty Ltd
WELL_NAME =	East Pilchard-1
CONTRACTOR =	Schlumberger
AUTHOR =	
ORIGINATOR =	Esso Australia Resources Ltd.
TOP_DEPTH =	
BOTTOM_DEPTH =	
ROW_CREATED_BY =	DN07_SW

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PE607401

This is an enclosure indicator page.
The enclosure PE607401 is enclosed within the container PE908923 at this location in this document.

The enclosure PE607401 has the following characteristics:

ITEM_BARCODE =	PE607401
CONTAINER_BARCODE =	PE908923
NAME =	East Pilchard-1 VSP Log Print
BASIN =	GIPPSLAND
ONSHORE? =	N
DATA_TYPE =	WELL
DATA_SUB_TYPE =	SYNTH_SEISMOGRAM
DESCRIPTION =	East Pilchard-1 Velocity Cross Plot Vertical Seismic Profile Depth Index Plot 3 of Appendix 5: Vertical Survey Report
REMARKS =	
DATE_WRITTEN =	
DATE_PROCESSED =	
DATE_RECEIVED =	13-FEB-2002
RECEIVED_FROM =	Esso Australia Pty Ltd
WELL_NAME =	East Pilchard-1
CONTRACTOR =	Schlumberger
AUTHOR =	
ORIGINATOR =	Esso Australia Resources Ltd.
TOP_DEPTH =	
BOTTOM_DEPTH =	
ROW_CREATED_BY =	DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)