GEOCHEMISTRY REPORT

EAST PILCHARD-1 WELL

Gippsland Basin

By
J.K. Emmett

February 2002

LIST OF TABLES AND FIGURES

LIST OF APPENDICES

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

<u>TOC and Rock-Pyrolysis</u>

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.

<u>Vitrinite Reflectance and Organic Petrography</u>

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.

<u>Gas Composition and Carbon Isotope Analysis</u>

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

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
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

TABLE 1

ANALYSIS OF ORGANIC MATTER BY ROCK-EVAL PYROLYSIS

EAST PILCHARD-1

GEOTECH

Depth (m)	*Age*	*Palynozone*	*Stratigraphy*		*Tmax*	*S1*	*S2*	*S3*	*S1+S2*	*S2/S3*	*PI*	*TOC*	*HI*	OI
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
GEOTECHNICAL SERVICES PTY LTD

Table 2

EAST PILCHARD, p 1

KK # Ref #.	Depth(m) /Type	$\bar{R}_{V}max$	Range	N	Sample description including liptinite fluorescence, maceral abundances, mineral fluorescence
T8076 Ctgs	1715-1720 $\bar{R}_{I}max$	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 $\bar{R}_{I}max$	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 $\bar{R}_{I}max$	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 $\bar{R}_{I}max$	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.)

Table 2

EAST PILCHARD, p 2

KK # Ref #.	Depth(m) /Type	$\bar{R}_{V}$max	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	$\bar{R}_{I}$max	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	$\bar{R}_{I}$max	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	$\bar{R}_{I}$max	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	$\bar{R}_{I}$max	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	$\bar{R}_{I}$max	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	$\bar{R}_{I}$max	1.64	1.34-2.18	10	

Table 2

EAST PILCHARD, p 3

KK # Ref #.	Depth(m) /Type	$\overline{R}_{V}max$	Range	N	Sample description including liptinite fluorescence, maceral abundances, mineral fluorescence
T8086 SWC	2997 $\overline{R}_{I}max$	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 $\overline{R}_{I}max$	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 $\overline{R}_{I}max$	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

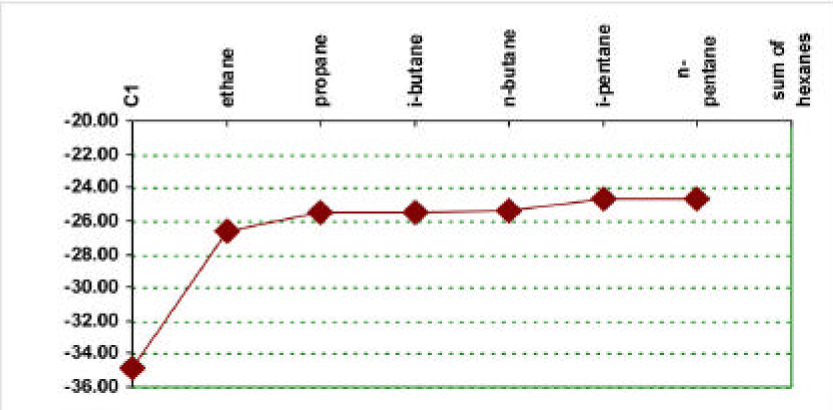
Table 3.1

AGSO Gas Report 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	

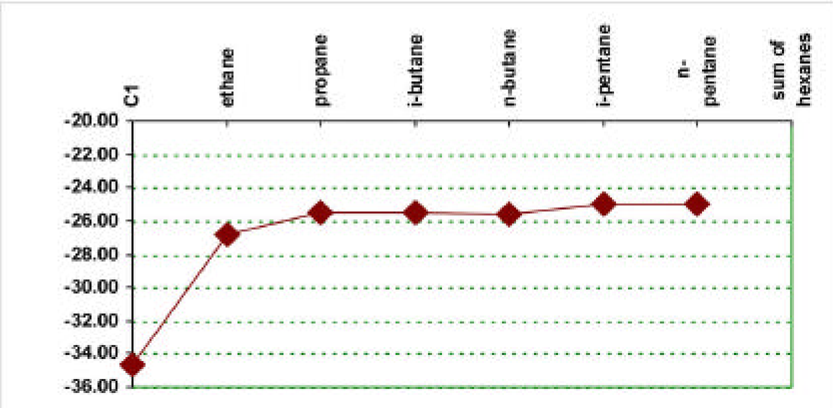
Table 3.2

AGSO Gas Report AGSO - Geoscience Australia

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	

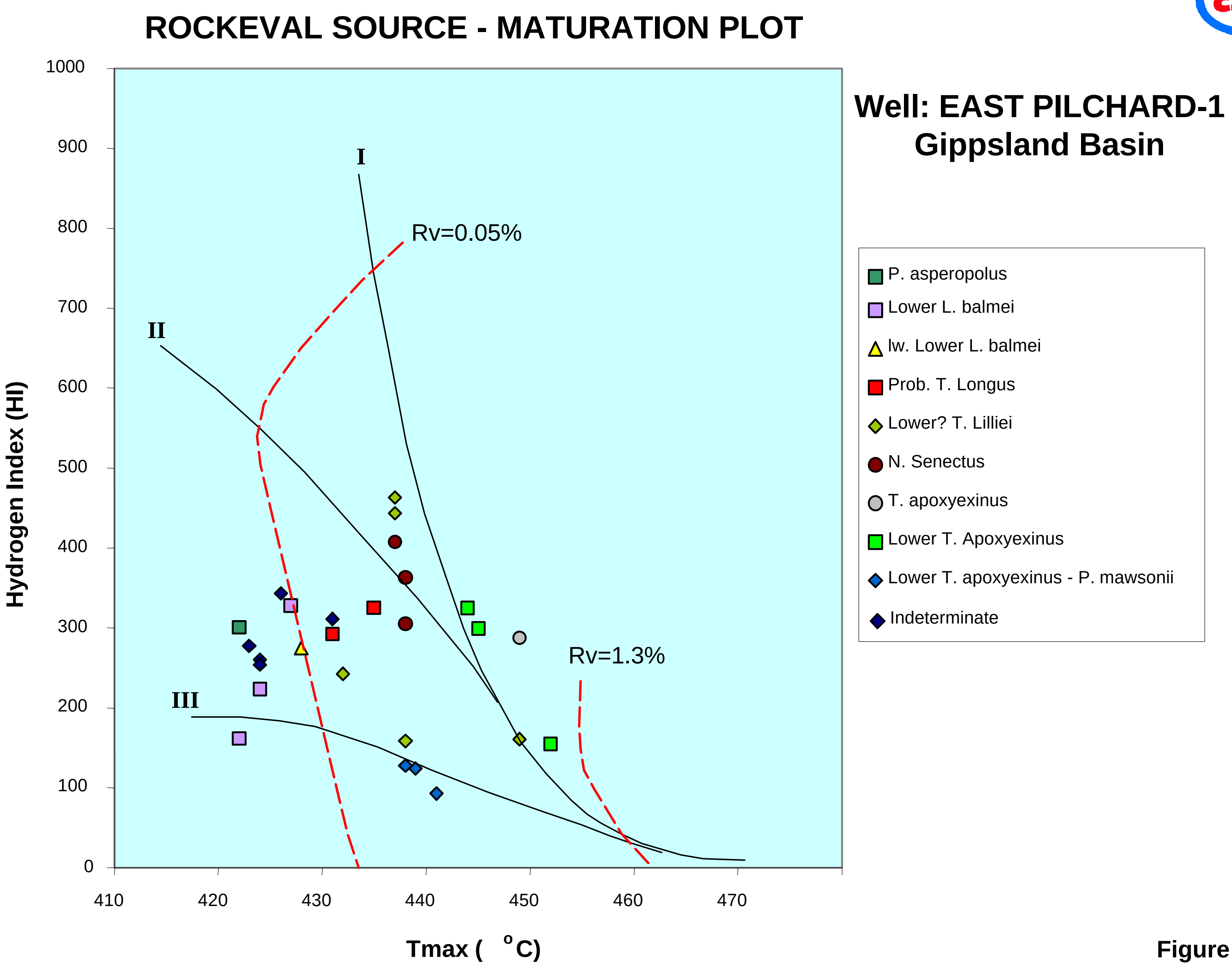

ROCKEVAL SOURCE - MATURATION PLOT
Well: EAST PILCHARD-1
Gippsland Basin
Hydrogen Index (HI)
1000
900
800
700
600
500
400
300
200
100
0
410
420
430
440
450
460
470
Tmax (°C)
I
II
III
Rv=0.05%
Rv=1.3%
P. asperopolus
Lower L. balmei
lw. Lower L. balmei
Prob. T. Longus
Lower? T. Lilliei
N. Senectus
T. apoxyexinus
Lower T. Apoxyexinus
Lower T. apoxyexinus - P. mawsonii
Indeterminate

Figure 1

Figure 2

Vitrinite Reflectance vs Depth

Well: EAST PILCHARD-1

Gippsland Basin

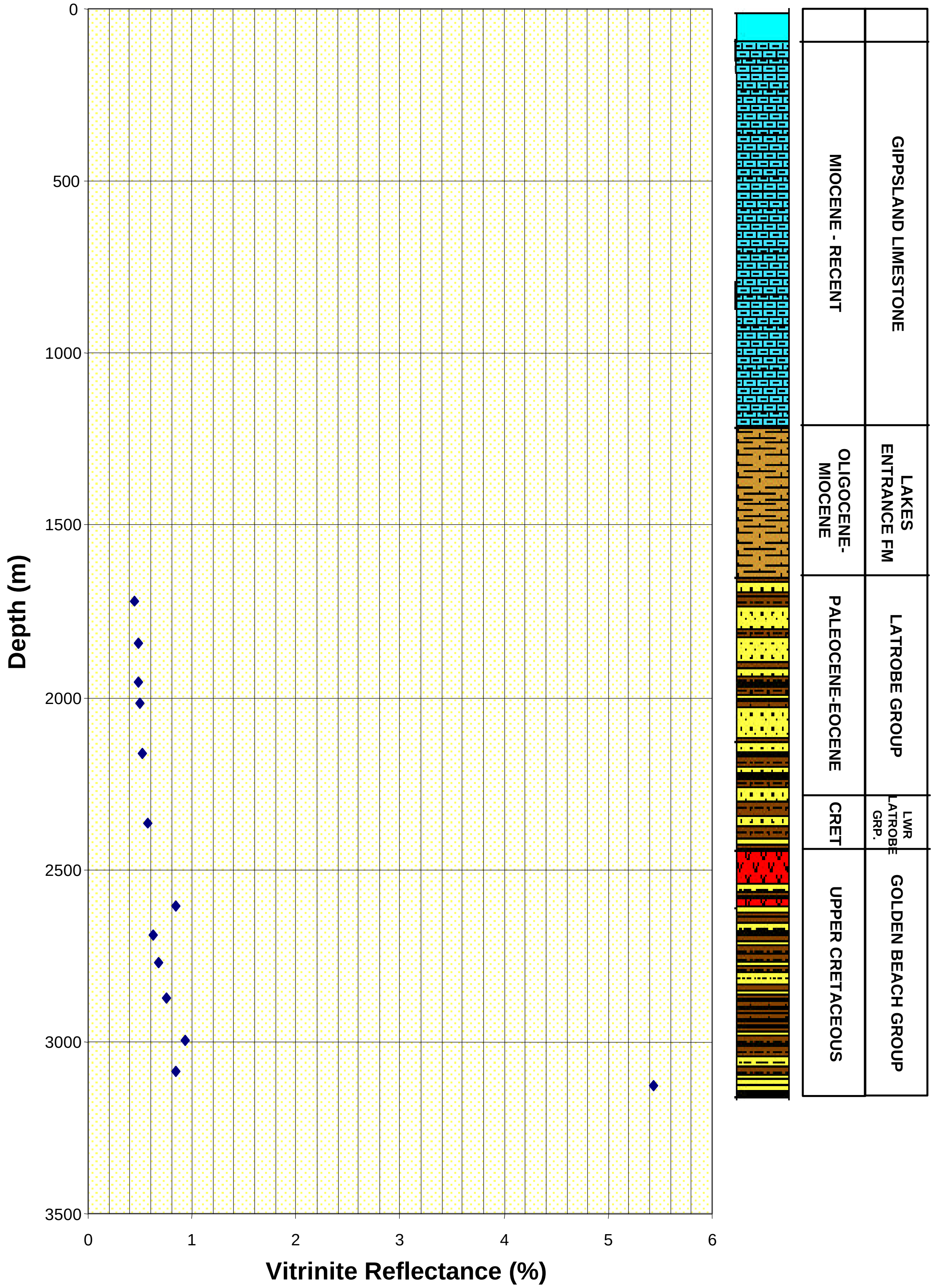
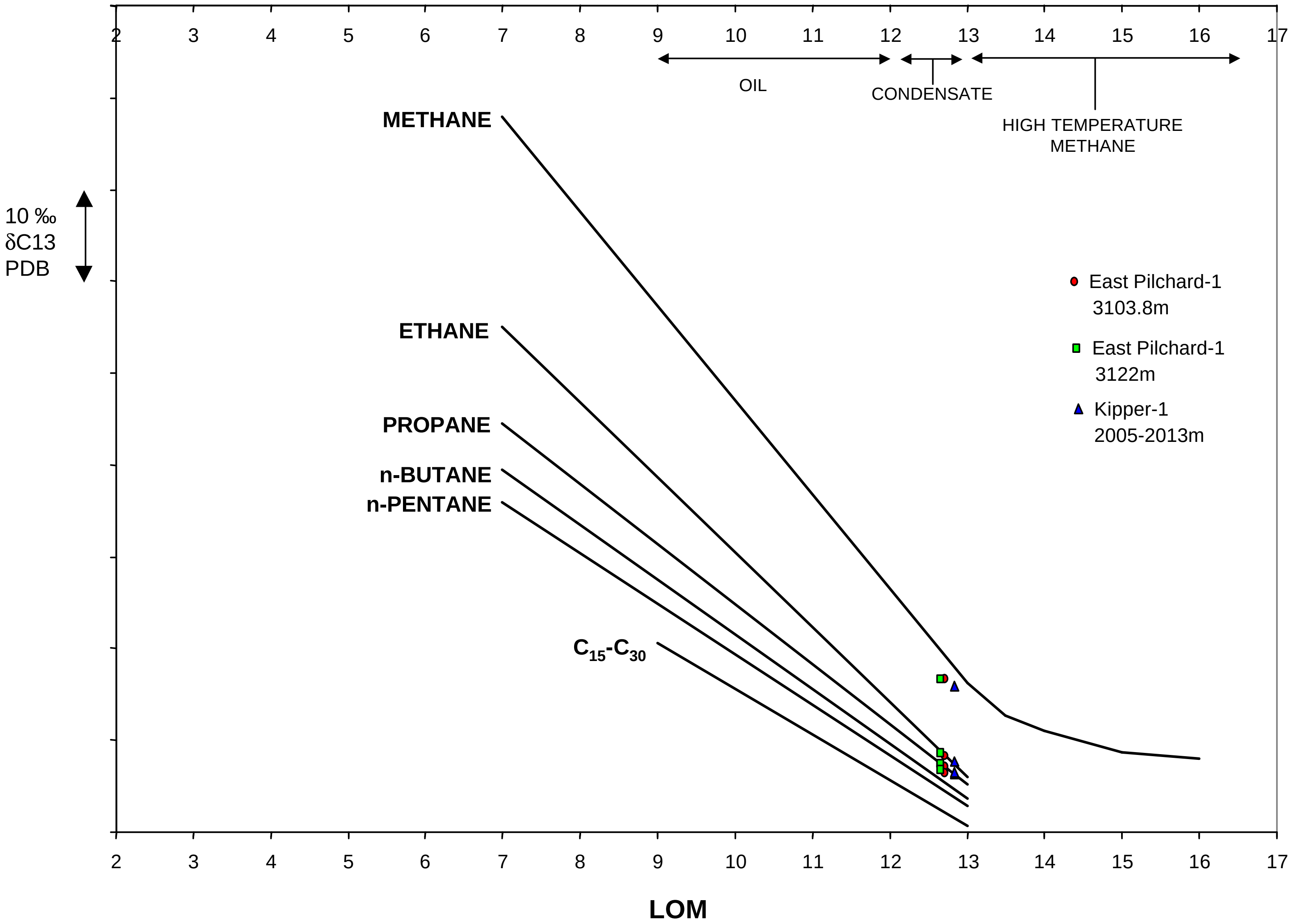


Figure 3

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



After James, 1983

East Pilchard-1
Geochemistry Report

APPENDIX 1

Details of vitrinite reflectance measurements
Keiraville Konsultants