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ORGANIC PETROLOGY OF SOME CORE SAMPLES FROM THE PERMIAN OF TASMANIA

Report

Prepared for

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data sheets for above samples.

Additional report on samples run in 2004 attached.

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1. INTRODUCTION

A total of thirteen core samples were received from Catherine Reid from the University of Tasmania for determination of vitrinite reflectance values. Descriptions were also made of the organic matter assemblages present in the samples. The samples come mostly from the Liffey Group but the Cascade Group, the Woody Island Siltstone and the Bundella Mudstone are also represented.

2. PREPARATION AND MOUNTING OF SAMPLES

The samples are all pieces from cores samples. The samples as received were cut to prepare sections up to 2x2 cm cut perpendicular to bedding. The sawn surfaces were placed on the base of the moulds that are numbered and range up to 2.8 cm square. Once they had been placed within the moulds the cut-pieces were dried in an oven at 105°C. The samples were then covered with polyester resin and evacuated to favour impregnation of the pores with the mounting resin. Evacuation time is limited to about 5 minutes to avoid bubbles being "frozen" within the gelling resin. Sample labels are inserted prior to the gelling of the resin. The resin gels after between 20 and 30 minutes and is set after about 1 hour. Grinding can be undertaken after about 24 hours but heating the set mounts at about 60°C can shorten this period.

The samples were then ground on the basal face. Generally the clays within the samples are not dispersive within water so that grinding and polishing could be undertaken using water as a carrier.

3. GRINDING AND POLISHING

Samples were ground to remove the layer of grains nearest the base of the mould using 60, 220, 400 and 1200 mesh wet and dry papers on rotating laps. All the grinding and polishing stages were undertaken using water as a carrier rather.

A final stage of grinding was done using 15-micron alumina powder on a velvet lap. This removes the fine scratches that are produced by the papers and reduces the polishing times that are required.

The coarse polishing stage used polishing grade chromium sesquioxide (GNM) on a velvet lap. Polishing speed for this stage was about 70 rpm. Chromium sesquioxide gives a rapid polish with only moderate relief. Any polishing powder that remains on the surface can easily be seen because of the distinctive green colour of chromium sesquioxide and care is taken to remove polishing powder after polishing. Samples were rotated during polishing to avoid a directional polish. Fine polishing was undertaken using gamma alumina on a velvet cloth lap with a variable speed lap. Normal polishing speed for this stage was about 50 r.p.m. This polishing agent and lap combination gives moderate polishing relief and controlled polishing relief is useful during identification of macerals. Again the samples are cleaned after being polished. Addition of a small amount of isopropanol can be useful in cleaning the polished surface, presumably due to its effects on the surface tension of the water.

4. REFLECTANCE MEASUREMENTS

Reflectance measurements were made in accordance with AS 2486. A Leitz MPV 1.1 photometer, mounted on a Leitz Orthoplan microscope, was used. Measurements were made using a 50x NPL oil immersion objective lens. The OPAK illuminator must be set so that the Berek prism is in the light train and the polarizer in the 45-degree position. A 10x ocular was used to project the image onto the field stop adjacent to the photometer. Total magnification from the system on to the photometer stop is 500x.

The field stop that is located in the mounting from the stabilized light source was set to illuminate a square of about 30 microns square on the sample. For measurements, the combination of settings for the stabilized quartz iodine lamp and the photomultiplier tube (PMT) voltage was set to give a readout that is essentially a direct reading of reflectance. This is done during calibration with the standards. The measuring stop in front of the photometer was set to an aperture giving a back projected image size on the sample of about 2 microns by 3 microns.

The standards used are the McCrone spinel (0.42%) yttrium aluminium garnet (0.90%) and the gallium gadolinium garnet (1.72%). Calibration runs were taken before and after each set of reflectance measurements or at any other time when there was evidence of drift. The main cause of rapid change is the presence of small air bubbles that rise into the oil from pores within the samples. Checking for air bubbles is done directly by introducing a focussing Bertrand lens to the light path. Rotation of the stage can also aid in the detection of bubbles as the density differences cause the bubbles to move as a result of centrifugal forces. Temperature within the microscope room with the photometer is kept within a range of 23°C ±2°C to ensure that the immersion oil has a refractive index (n_e=1.518) within the required limits.

Mean maximum reflectances were measured. To obtain these, after a vitrinite field had been acquired, the stage is rotated until a maximum is obtained. The stage is then rotated 180 degrees to obtain a second maximum. Provided the two values are within about 5% relative, they are accepted and averaged. Therefore the number of measurements taken is twice the number of fields reported as being measured. The overall mean, ranges and standard deviations were reported, together with descriptions of each sample, including estimated maceral abundances by volume. Variation of readings on rotation is usually associated with local tilt due to polishing relief or, with low rank coals and large fragments of telovitrinite, the development of desiccation cracks. A check on tilt can be made using the Bertrand lens. Although the effects of tilt cannot be eliminated, they can be minimised by taking measurements at the location where N-S run-out of the image using the Betrand lens is at a minimum. This last procedure was not required for the present suite of samples.

Higher rank vitrinite can show distinct to extreme bireflectance. Where reflectance is high but bireflectance low, this is normally evidence for contact alteration. With the polarizer in the light train, coke textures can normally be detected in the white light image. The use of partially or completely crossed polars provides a more sensitive test of the present of coke mosaic and mosaic size. The present sample suite contains some samples with moderately high levels of vitrinite reflectance and incipient coke textures. It is probable that the incipient cokes textures are due to contact alteration.

Even after careful centring of the lens, stage run-out is typically about 0.002 to 0.003 mm. This means that where pairs of readings are made, although these are almost on the same area of vitrinite, the exact areas for the two component readings for each measurement may be slightly different. Thus the number of fields measured is effectively more than the number reported in the data listings. For this reason, means and histograms are more robust statistically than where single readings have been taken.

For samples with clearly defined vitrinite populations, the mean reflectance has stabilised after about 20 readings and the base number of fields measured (N) is usually 25. Where multiple populations or other complications are present, the number of fields was increased provided sufficient fields could be found. However, even when relatively low numbers of fields can be found, provided accurate identifications of vitrinite can be made, the means obtained will show only minor departures from the stable values.

5. MACERAL ANALYSES

The macerals recognized are listed in Table 1. The classification given here differs slightly from those used in ICCP 1994 and Taylor *et al* (1998). The major differences relate to the combination of terms for lower rank vitrinite macerals (termed huminite in Taylor *et al.*) and to the macerals within alginite. The use of the term vitrinite over the full range of rank or maturation simplifies descriptions and does not result in the loss of any information.

Point counts are reliable only where organic matter is at least a major component (>10% and desirably >25%) and this was not the case for the samples in the present suite. For samples with low organic matter abundance, the errors associated with point counts become unacceptably high, unless very large numbers of points are counted. Therefore, visual estimates were made of organic matter abundance. This was done using comparison charts.

Examinations were made using the plane slip illuminator and fluorescence-mode was used for all fields for the samples where fluorescing liptinite was present. Fluorescence-mode illumination is also used to determine mineral fluorescence characteristics. Where organic matter is a minor component, abundance estimation is more reliable than the point-count technique.

Oil inclusions are detected using reflected light fluorescence-mode.

Maceral and vitrinite reflectance accreditation certificates from ICCP for the analysts are numbered ICCP/FA/42.1/0136AB (31/12/2004) and ICCP/FA/42.2/0137AB (31/12/2004).

6. SEQUENCE DURING EXAMINATION OF SAMPLES

Samples were examined first using a low power air immersion lens in order to examine the overall textures. After immersion oil was placed on the sample, reflectance measurements are made as soon as possible. Experience shows that reflectance values can decrease following immersion in oil, usually after a period of some hours. Therefore, making reflectance measurements within an hour of initial immersion eliminated the possibility of this occurring. Some fluorescence examinations were undertaken concurrently with the measurement of reflectance, mostly for the lower vitrinite reflectance samples to check on the presence or absence of fluorescence from the vitrinite.

Following the measurement of vitrinite reflectance, the samples were examined in fluorescence and white light modes to obtain the maceral analyses. For the samples with lower levels of maturation examination was made using both white light and fluorescence-modes.

Where abundance terms are used, these are defined as follows:

CATEGORY	PERCENTAGE (by volume)
ABSENT	0.0
RARE	<0.1
SPARSE	0.1-0.4
COMMON	0.5-1.9
ABUNDANT	2.0-9.9
MAJOR	10.0-49.9
DOMINANT	50.0-100

Coal and shaly coal were not present, but these definitions are used for coal and shaly coal:

COAL	ORGANIC MATTER >80%
SHALY COAL	40% < % ORGANIC MATTER <80%

Especially for samples that have maturation levels within the oil generation window, fluorescence intensity tends to increase on exposure to the fluorescence excitation beam. For some of the early to mid-mature samples, some fields were subjected to prolonged irradiation to check on alteration properties of the organic matter and minerals. Where natural (crude) oil is present, oil haze may develop within the immersion oil after the sample has been immersed for some minutes. The presence of oil drops and the development of oil haze were both noted where they occurred.

7. ORGANIC MATTER ASSEMBLAGES

Detailed descriptions of the samples are given in Appendices 1 and 2. Each description gives abundances of dispersed organic matter (dom) in terms of the class intervals described in the section above. Brief descriptions of the rock types are also given. In reflected white light and fluorescence-mode some silicate and carbonate minerals can be identified and some mineralogical information is included in the descriptions. A majority of the samples are either silty or sandy in terms of grain size.

The organic matter assemblages are dominated by inertinite with large lenses of semifusinite and fusinite being common in some of the samples. A dominance of inertinite is common for the dispersed organic matter (dom) in sequences of Permian age and this is especially true in the case of the coarser lithologies.

A small number of the samples contain rare telalginite (Plates 1 and 3) that is derived from the genus *Reinschia* that is related to the modern non-marine genus *Botryococcus*. Alginite derived from *Reinschia* is abundant in some of the sequences in Tasmania. Telalginite derived from the marine alga *Tasmanites*. No telalginite of this second type was found within any of the samples.

Oil drops were found in a small number of samples (Plates 1 and 4). The best-developed inclusions are those in sample T9029. In this sample, they occur within quartz grains and generally appear to be within fractures. Dark zones, within the oil inclusions and associated with the presence of gas bubbles, were noted in some fields but are not seen in the Plates. The abundance of oil within T9029 is important is showing that oil is present within the samples up to high levels of maturation that lie close to the floor of the oil window, sometime termed the oil deadline. It should be noted that oil inclusions are found within some basins at ranks higher than the oil deadline (Kim and Cook, 1988a,b).

8. VITRINITE REFLECTANCES

Vitrinite reflectance values are given in Appendices 1 and 2. Where vitrinite was not present, inertinite reflectances are given. A correlation between inertinite and vitrinite reflectances is given in Smith and Cook (1980) and a version of this is reproduced in SA 2486. The vitrinite reflectance must lie below the lowest inertinite value and an estimate of the vitrinite reflectance can be made from the inertinite mean. However, Smith and Cook qualified their correlation by noting that the inertinite population should be large and diverse. The inertinite in dom associated with siltstone is usually less than ideal, but the inertinite means still provide a general indicator of the likely vitrinite reflectance values.

The vitrinite reflectance values found range from 0.57% to 1.74%. The lower part of this range is close to the general regional level of maturation across many areas of Tasmania. The higher values are likely to indicate some level of contact alteration. T8904 contains small grains of semicoke and this is indicative of contact alteration. Cokes are not, however, widespread within this group of samples and this is consistent with the indications received that the samples are relatively distant from the nearest intrusions. The zone within coke structures may be expected in variable. Where intrusions occur at shallow levels, this zone seldom exceeds about 20 to 30 m but it can reach some kilometres where intrusions occur at large depths of cover and where the coals are of bituminous rank at the time of the intrusion. Localized coking can, however, be associated with gas streaming in zones peripheral to intrusions.

The samples with vitrinite reflectance values in the range 0.7% to 0.9% are likely to have suffered minor contact alteration. In some examples of minor contact alteration, the liptinite macerals show anomalous optical properties but the liptinite within the present suite of samples has normal properties for the reflectance levels found in the associated vitrinite.

9. CONCLUSIONS

The samples are dominantly silty of sandy and contain organic matter populations that are dominated by inertinite. Vitrinite reflectance values range from 0.57%, which probably represents the regional coalification level to 1.74%, a value that is due to contact alteration. Small amounts of semicoke are present in one sample. Oil drops were noted in a small number of samples. Some of the oil drops occur within samples that have been subject to a degree of contact alteration and this indicates that parts of the contact alteration zones may represent potential plays for oil and gas exploration.

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TABLE 1. MACERAL CLASSIFICATION USED IN THIS STUDY

MACERAL GROUP	MACERAL SUBGROUP	MACERAL	SUB-MACERAL
VITRINITE	TELOVITRINITE	TEXTINITE	TEXTINITE A & B
		TEXTO-ULMINITE	TELINITE
		EU-ULMINITE	
		TELOCOLLINITE	COLLOTELINITE
	DETROVITRINITE	ATTRINITE	
		DENSINITE	
		DESMOCOLLINITE	
	GELOVITRINITE	CORPOGELINITE	
		PORIGELINITE	
		EUGELINITE	
INERTINITE	TELO-INERTINITE	FUSINITE	
		SEMIFUSINITE	
		FUNGINITE (Sclerotinite)	
	DETRO-INERTINITE	INERTODETRINITE	
		MICRINITE	
LIPTINITE		SPORINITE	
		CUTINITE	
		SUBERINITE	
		RESINITE	
		FLUORINITE	
		LIPTODETRINITE	
		ALGINITE	TELALGINITE
			LAMALGINITE
		BITUMINITE	
		EXSUDATINITE*	

NOTE: ICCP now uses the same divisions to the sub-group level (ICCP 1994 System). At the maceral level, ICCP terminology is now moving to use a single system for low and moderate to high levels of maturation. * Exsudatinite is a primary bitumen and should be included with other bitumens but at present is included by ICCP within the maceral system.

PLATES

Plate 1. T8901, D/H GV, 344.8m. Bundella Mudstone. Lamalginite yellow to orange and small lens of telalginite bright yellow. The telalginite is surrounded by small specks of probable oil (O) within the matrix. $\overline{R}_{vmax}$ 0.80%. Fluorescence-mode, field width 0.22mm

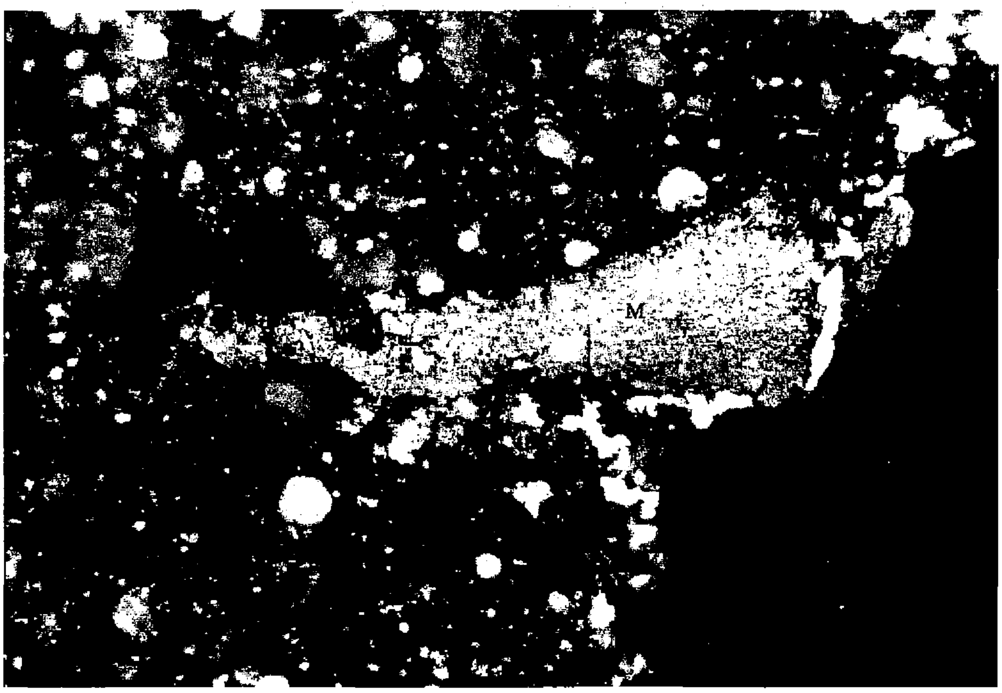

Plate 2. T8904, D/H T, 676.3m. Woody Island Siltstone. Lens of semicoke with fine mosaic and reflectance of 1.33%. $\overline{R}_{vmax}$ 1.74%. Reflected white light mode, field width 0.22 mm.

Plate 3. T9031, D/H R, 171.5m. Liffey Group. Colony of the alga *Reinschia* sp preserved as telalginite (R). The *Reinschia* shows well-preserved cellular structure. $\overline{R}_{vmax}$ 0.76%. Fluorescence-mode, field width 0.22mm

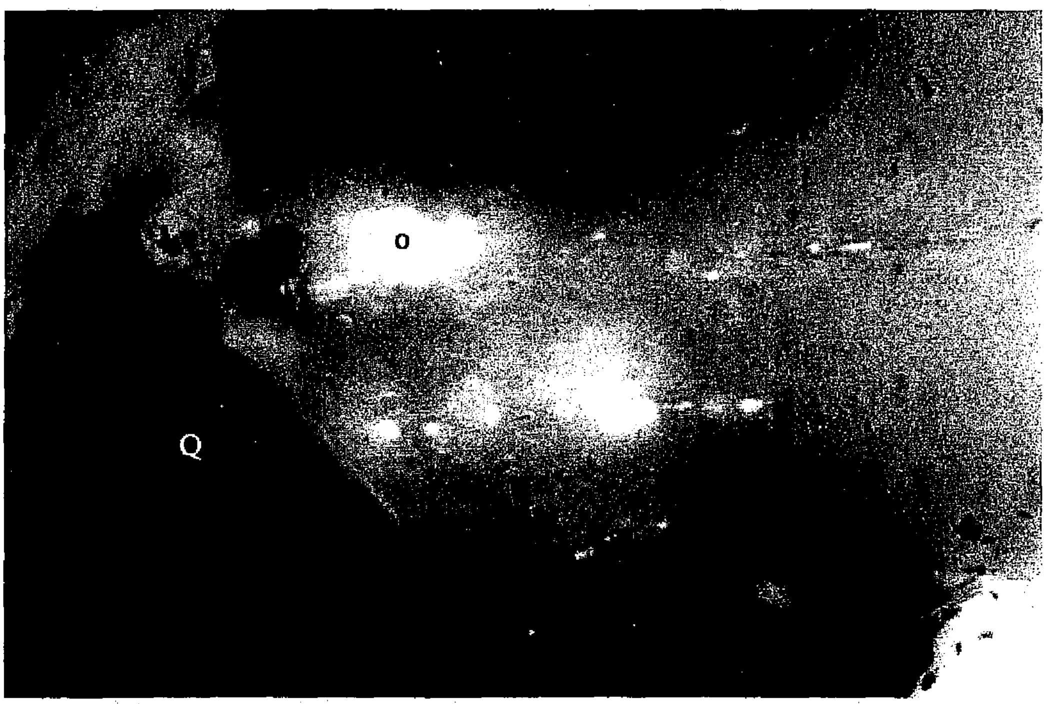

Plate 4. T9029, D/H H, 869.5m. Liffey Group. Quartz grains lacking fluorescence (Q) and strongly fluorescing with abundant inclusions of oil (O). The oil inclusions occur along fractures. A free gas phase is seen in some inclusions but those illustrated in this field appear to lack a free gas phase. $\overline{R}_{vmax}$ 1.23%. Fluorescence-mode, field width 0.22mm

Appendix 1. Suite one.

KK # Ref #.	Depth (m) /Type	$\overline{R}_v$max	Range	N	**DRILLHOLE H, p 1** Sample description including liptinite fluorescence, maceral abundances, mineral fluorescence
					CASCADE GROUP
T8898 Core	828.5 $\overline{R}_I$max	- 2.09	- 1.54-3.46	- 25	Fluorescing liptinite absent. (Siltstone with minor silty claystone. Dom common, I. Inertinite common, vitrinite and liptinite absent. Mineral fluorescence pervasive moderate orange. Iron oxides rare. Pyrite abundant.)
					LIFFEY GROUP
T8899 Core	856.5 $\overline{R}_I$max	1.06 2.10	0.94-1.26 1.62-2.72	9 25	Fluorescing liptinite absent. (Siltstone. Dom abundant, I>>V. Inertinite abundant, vitrinite rare, liptinite absent. Diffuse organic matter common. Mineral fluorescence patchy moderate orange. Iron oxides rare. Pyrite rare.)
					BUNDELLA MUDSTONE
T8900 Core	874.4 $\overline{R}_I$max	- 2.02	- 1.56-2.84	- 25	Fluorescing liptinite absent. (Argillaceous siltstone with minor sandstone. Dom common, I. Inertinite common, vitrinite and liptinite absent. Sparse foraminiferal tests. Mineral fluorescence patchy weak orange. Iron oxides rare. Pyrite abundant.)

The shallowest sample appears to contain only inertinite. Identification of vitrinite in dispersed organic matter (dom) is difficult at vitrinite reflectance levels between about 1.0% and 2.0% and it is possible that the lower part of the range reported as inertinite includes some vitrinite. However, the vitrinite present within the second sample was relatively easy to distinguish, suggesting that the other two samples do not contain vitrinite.

No evidence was found of carbonized organic matter, but the level of vitrinite reflectance may have been elevated by the doleritic intrusions near the horizons sampled. Small amounts of oil droplets are present in the two deeper samples. The oil is occluded within mineral grains.

KK # Ref #.	Depth (m) /Type	$\overline{R}_v$max	Range	N	**DRILLHOLE GV, p 1** Sample description including liptinite fluorescence, maceral abundances, mineral fluorescence
					BUNDELLA MUDSTONE
T8901 Core	34.8 $\overline{R}_I$max	0.80 1.88	0.66-0.92 1.26-2.62	4 25	Sparse lamalginite and liptodetrinite, orange to dull orange, rare sporinite, orange to dull orange, rare *Botryococcus*-related telalginite, bright orange. (Sandy siltstone. Dom common, I>L>V. Inertinite and liptinite common, vitrinite rare. Sparse foraminiferal tests. Mineral fluorescence weak dull orange. Iron oxides rare. Pyrite sparse.)
					WOODY ISLAND SILTSTONE
T8902 Core	142.4 $\overline{R}_I$max	0.73 1.72	0.68-0.77 1.28-2.40	2 25	Abundant lamalginite and sparse liptodetrinite, orange to dull orange, sparse sporinite, orange to dull orange, rare *Botryococcus*-related telalginite, bright orange. (Argillaceous siltstone. Dom abundant, L>I>V. Liptinite abundant, inertinite sparse to common, vitrinite rare. Mineral fluorescence weak dull orange. Iron oxides rare. Pyrite abundant.)

Small populations of vitrinite are present in both the samples and fluorescing liptinite is also present. Mineral fluorescence is very weak in the shallower of the two samples. More normal mineral fluorescence is present in the deeper sample

Lamalginite is present in both samples and a small colony of *Botryococcus*-type telalginite was noted in T8901. Both samples also contain moderate-sized thin-walled palynomorphs that may be small tasmanitid cysts.

KK # Ref #.	Depth (m) /Type	$\overline{R}_v$max	Range	N	**DRILLHOLE T, p 1** Sample description including liptinite fluorescence, maceral abundances, mineral fluorescence
					LIFFEY GROUP
T8903 Core	383.6	1.71	1.45-1.94	25	Fluorescing liptinite absent. (Sandy siltstone. Dom common, I>V. Inertinite common, vitrinite sparse, liptinite absent. Diffuse organic matter abundant. Sparse yellow fluorescing specks in the fractures in some quartz grain, probably from oil. Mineral fluorescence patchy weak orange. Iron oxides rare. Pyrite common.)
	$\overline{R}_I$max	2.77	2.26-4.54	10	
					WOODY ISLAND SILTSTONE
T8904 Core	676.3	1.74	1.53-1.87	10	Fluorescing liptinite absent. (Claystone. Dom sparse, I>V. Inertinite sparse, vitrinite rare, liptinite absent. Coke rare, fine mosaic. Diffuse organic matter abundant. Mineral fluorescence patchy weak orange. Iron oxides rare. Pyrite abundant.)
	$\overline{R}_I$max	2.61	2.14-4.70	20	

The fields reported as vitrinite show relatively angular outlines and the vitrinite populations are not well-defined. The restricted ranges of reflectance found suggest that the material is vitrinite but it is possible that they represent low reflecting inertinite. The deeper of the samples contains one larger phytoclast that shows semicoke textures, with a fine coke mosaic. The reflectance of the semicoke is about 1.33% but with fine mosaics it is difficult to measure the maximum reflectance. The deeper sample clearly has been affected by contact metamorphism and it is likely that its vitrinite reflectance was about 0.6% or 0.7% at the time when the contact alteration occurred.

KK # Ref #.	Depth (m) /Type	$\overline{R}_v$max	Range	N	**OUTCROP SAMPLE, p 1** Sample description including liptinite fluorescence, maceral abundances, mineral fluorescence
					WOODY ISLAND SILTSTONE
T8905 Outcrop	-	1.31	1.16-1.45	5	Fluorescing liptinite absent. (Argillaceous siltstone. Dom sparse, I>V. Inertinite sparse, vitrinite rare, liptinite absent. Mineral fluorescence pervasive dull orange with bright orange patches. Most of the bright areas seem to represent oil inclusions but some could be liptodetrinite. If they do represent liptodetrinite, the values reported as vitrinite may represent low reflectance inertinite. Iron oxides rare. Pyrite sparse, locally abundant.)
	$\overline{R}_I$max	2.28	1.62-4.74	25	

A small population is present that is similar morphologically to the populations reported as vitrinite for the samples from Drillhole T. Again, it is possible that the material reported as vitrinite is a low reflecting inertinite population but the relatively small range is more consistent with it representing vitrinite. The presence of occluded oil is possible at a vitrinite reflectance of about 1.3%. However, if the more elongate fluorescing areas are liptodetrinite, then the vitrinite reflectance reported is too high.

Appendix 2. Second suite of samples

KK # Ref #.	40772 Depth (m)	$R_v$max Mean	Range	SD	N	UNIVERSITY OF TASMANIA Sample description including liptinite fluorescence maceral abundances, mineral fluorescence
						H - Liffey Group
T9028	850.5	1.28*	0.90-1.55	0.195	17	Fluorescing liptinite absent. (Sandstone with abundant fossils, ?fish. Dom common, "V">I, L absent. *The material included within the reported vitrinite population includes some telovitrinite, some detrovitrinite and some material that appears to represent bitumen inclusions within ?fish bones. Some of the bitumen occurrences show fine coke mosaic. Rare bright yellow oil drops within ?carbonate. Mineral fluorescence patchy, bright orange to weak dull orange. Pyrite abundant.)
Core	$\overline{R}_I$max	2.10	1.54-2.72	0.456	5	
T9029	869.5	1.23	1.11-1.31	0.061	25	Fluorescing liptinite absent. (Sandstone. Dom abundant, V>I, L absent. Vitrinite abundant, inertinite common and liptinite absent. A high proportion of the vitrinite is present as thick layers of telovitrinite with common to abundant pyrite. Oil drops common, small to moderate in size, within quartz grains and probably within overgrowths, but overgrowth boundaries are not clearly defined. Some of the oil inclusions show prominent gas bubbles. Mineral fluorescence patchy, moderate orange to weak dull orange. Pyrite common to abundant.)
Ctgs						
						R - Liffey Group
T9030	138.4	0.80	0.60-0.94	0.099	24	Rare cutinite dull orange, rare sporinite orange to dull orange. (Silty sandstone. Dom abundant, I>V>L. Inertinite abundant, vitrinite common and liptinite rare. A small proportion of the vitrinite is present as thin layers of telovitrinite. Mineral fluorescence weakly patchy, moderate to weak dull orange. Pyrite common to abundant.)
Ctgs	$\overline{R}_I$max	1.46	1.04-2.78	0.461	11	
T9031	171.5	0.76	0.61-0.93	0..111	17	Common sporinite yellowish orange to dull orange, sparse telalginite yellowish orange to dull orange, rare resinite dull orange. (Sandy siltstone. Dom abundant, I>L>V. Inertinite abundant, liptinite common, vitrinite rare to sparse. The telalginite is derived from *Reinschia sp.* and shows well preserved cell structures. The presence of telalginite may be the cause of the lower reflectances in this sample compared with T9030 rather than a lower level of rank. Rare thucholitic bitumens, too poorly developed for reflectances to be measured but appear to be about 0.6%. Mineral fluorescence weakly patchy, moderate to weak dull orange. Iron oxides sparse to common. Pyrite sparse to common.)
Ctgs	$\overline{R}_I$max					
						Q - Liffey Group
T9032	20.4	0.57	0.42-0.71	0.084	25	Rare cutinite dull orange. (Silty micaceous sandstone. Dom abundant, I>V>L. Inertinite abundant, vitrinite sparse, liptinite rare. The inertinite is dominated by large phytoclasts of fusinite and semifusinite. Most of the vitrinite appears to be either from root tissues or more rarely leaves. Mineral fluorescence weak dull orange. Pyrite sparse.)
Ctgs	$\overline{R}_I$max					

The organic matter assemblages in most of the samples are dominated by inertinite, mainly semifusinite and fusinite. T9031 contains sparse telalginite that is fresh-water in origin. Oil inclusions are prominent in T9028. In T9031 the presence of thucholitic bitumen on a small grain of zircon indicates some migration of hydrocarbons through the section.

Most of the samples show prominent populations of relatively massive low reflecting inertinite. This makes determination of vitrinite reflectance relatively difficult. However, the determination for T9028 is the only one that is problematical.

ACC 31 March 2003

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	1		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		1.92			2.22	1		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	1		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		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	1		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		2.30	2		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	1		2.02	2		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	NO	FGV	1.14			1.44			1.74			2.04	1		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		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	1		2.12	1		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	2	↑	1.84			2.14	1		2.44	1		2.74	1	
0.35			0.65			0.95			1.25			1.55		Inert	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			2.96	1	Inert
0.39			0.69			0.99			1.29			1.59			1.89			2.19			2.49			3.46	1	↓

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

Sample Number..T8898.....Well Name...UNIVERSITY OF TASMANIA, Drillhole H.....CASCADE GROUP............. Depth...H828.5m........ .... SampleType....Core...
Date. ..10/.11/ 2002.. Op..SPR........ FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite, Cav - Cavings, DA - Drilling Mud Additives

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		1.30			1.60			1.90	1		2.20	1		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	↑	1.92	1		2.22			2.52	2	
0.13			0.43			0.73			1.03			1.33			1.63		Inert	1.93			2.23			2.53		
0.14			0.44			0.74			1.04	2		1.34			1.64			1.94			2.24	1		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		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		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			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	1		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		2.04			2.34	1		2.64	1	
0.25			0.55			0.85			1.15	1		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	1		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	1		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		Inert
0.32			0.62			0.92			1.22			1.52			1.82			2.12	1		2.42			2.72	1	↓
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	↑	1.24			1.54			1.84	1		2.14			2.44			2.74		
0.35			0.65			0.95	1	FGV	1.25		FGV	1.55			1.85			2.15			2.45			2.75		
0.36			0.66			0.96			1.26	1	↓	1.56			1.86	1		2.16	1		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		2.18			2.48			2.78		
0.39			0.69			0.99	1		1.29			1.59			1.89			2.19			2.49			2.79		

VITRINITE <0.1		INERTINITE 2.2%						LIPTINITE -								OIL DROPS <0..1	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor	Cut	Sub	Res	Ld	Bituminite	Telalginite	Lamalginite	Oil cut	

Sample Number..T8899....Well Name...UNIVERSITY OF TASMANIA, Drillhole H.......LIFFEY GROUP............ Depth...H856.5.... .... SampleType....Core...
Date. ..10/.11/ 2002.. Op..SPR........ FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite, Cav - Cavings, DA - Drilling Mud Additives MICR D:\RWORK\utasvrw.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
0.10			0.40			0.70			1.00			1.30			1.60	1		1.90			2.20	1		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		1.92	3		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		2.24	1		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	2		1.96			2.26	1		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		1.98	1		2.28	1		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	1		2.00			2.30			2.60	1	
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	1		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	1		2.34			2.64		
0.25			0.55			0.85	NO	FGV	1.15			1.45			1.75			2.05			2.35			2.65		
0.26			0.56			0.86			1.16			1.46			1.76	1		2.06	1		2.36			2.66	1	
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	1		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	↑	1.86			2.16			2.46			2.76		
0.37			0.67			0.97			1.27			1.57		Inert	1.87			2.17			2.47					
0.38			0.68			0.98			1.28			1.58			1.88			2.18			2.48					Inert
0.39			0.69			0.99			1.29			1.59			1.89			2.19			2.49			2.84	1	↓

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

Sample Number..T8900.....Well Name...UNIVERSITY OF TASMANIA, Drillhole H.......BUNDELLA MUDSTONE.................... Depth...H874.4m........ .... SampleType....Core...
Date. ..10/.11/ 2002.. Op..SPR........ FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite, Cav - Cavings, DA - Drilling Mud Additives MICR D:\RWORK\utasvrw.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
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		1.92			2.22	1		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	1		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	1	
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		1.68			1.98	2		2.28			2.58		
0.19			0.49			0.79	1		1.09			1.39			1.69			1.99			2.29			2.59		
0.20			0.50			0.80			1.10			1.40			1.70	1		2.00			2.30			2.60		
0.21			0.51			0.81			1.11			1.41			1.71			2.01			2.31			2.61		Inert
0.22			0.52			0.82			1.12			1.42			1.72	1		2.02			2.32			2.62	1	↓
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		1.14			1.44	1		1.74	1		2.04	2		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	1		2.06	1		2.36	1		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	1		2.40			2.70		
0.31			0.61			0.91		FGV	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			0.94			1.24			1.54	1		1.84			2.14	1		2.44	1		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	2	↑	1.56			1.86			2.16			2.46			2.76		
0.37			0.67		FGV	0.97			1.27		Inert	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 <0.1 %		INERTINITE 1.0%						LIPTINITE 0.6%								OIL DROPS	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor	Cut	Sub	Res	Ld 0.2	Bituminite	Telalginite <0.1	Lamalginite 0.4	Oil cut	

Sample Number..T8901.....Well Name...UNIVERSITY OF TASMANIA, Drillhole GV...BUNDELLA MUDSTONE.............. Depth...GV34.8m........ .... SampleType....Core...
Date. ..10/.11/ 2002.. Op..SPR........ FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite, Cav - Cavings, DA - Drilling Mud Additives

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		FGV	1.06			1.36			1.66	1		1.96	1		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		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		1.70	2		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	2		1.72			2.02	1		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		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		1.76	1		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		Inert	2.69		
0.30			0.60			0.90			1.20			1.50	2		1.80			2.10	1		2.40	2	↓	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		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		1.84			2.14	1		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		1.86			2.16	1		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	1	↑	0.98			1.28	1	↑	1.58			1.88	1		2.18			2.48			2.78		
0.39			0.69		FGV	0.99			1.29		Inert	1.59			1.89			2.19			2.49			2.79		

VITRINITE <0.1 %		INERTINITE 0.5%						LIPTINITE 2.3%								OIL DROPS	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor 0.2	Cut	Sub	Res	Ld 0.1	Bituminite	Telalginite <0.1	Lamalginite 2.0	Oil cut	

Sample Number..T8902.....Well Name...UNIVERSITY OF TASMANIA, Drillhole GV...WOODY ISLAND SILTSTONE........... Depth...GV142.4m....... .... SampleType....Core... Date. ..10/.11/ 2002.. Op..SPR........ FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite, Cav - Cavings, DA - Drilling Mud Additives

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	1	
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	2		1.92			2.22			2.52		
0.13			0.43			0.73			1.03			1.33			1.63			1.93		FGV	2.23			2.53		
0.14			0.44			0.74			1.04			1.34			1.64	1		1.94	1	↓	2.24			2.54	1	
0.15			0.45			0.75			1.05			1.35			1.65	1		1.95			2.25			2.55		
0.16			0.46			0.76			1.06			1.36			1.66			1.96			2.26	1	↑	2.56		
0.17			0.47			0.77			1.07			1.37			1.67			1.97			2.27		Inert	2.57		
0.18			0.48			0.78			1.08			1.38			1.68	2		1.98			2.28			2.58	1	
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	1	
0.21			0.51			0.81			1.11			1.41			1.71	1		2.01			2.31			2.61		
0.22			0.52			0.82			1.12			1.42			1.72	2		2.02			2.32			2.62	1	
0.23			0.53			0.83			1.13			1.43			1.73	2		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	↑	1.75	1		2.05			2.35			2.65		
0.26			0.56.			0.86			1.16			1.46		FGV	1.76			2.06			2.36			2.66	1	
0.27			0.57			0.87			1.17			1.47			1.77	2		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		1.80	1		2.10			2.40			2.70		
0.31			0.61			0.91			1.21			1.51	1		1.81	1		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	1		2.13			2.43			2.73		
0.34			0.64			0.94			1.24			1.54			1.84			2.14			2.44	1		2.74		
0.35			0.65			0.95			1.25			1.55			1.85	1		2.15			2.45					
0.36			0.66			0.96			1.26			1.56			1.86			2.16			2.46					
0.37			0.67			0.97			1.27			1.57			1.87			2.17			2.47			2.98	1	
0.38			0.68			0.98			1.28			1.58	1		1.88	1		2.18			2.48					Inert
0.39			0.69			0.99			1.29			1.59			1.89	1		2.19			2.49			4.54	1	↓

VITRINITE 0.4 %		INERTINITE 1.3%						LIPTINITE -%								OIL DROPS	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor	Cut	Sub	Res	Ld	Bituminite	Telalginite	Lamalginite	Oil	cut

Sample Number..T8903.....Well Name...UNIVERSITY OF TASMANIA, Drillhole T....LIFFEY GROUP............. Depth...T383.6mm........ .... SampleType....Core...

Date. ..15/.11/ 2002.. Op..SPR........ FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite, Cav - Cavings, DA - Drilling Mud Additives

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	1	
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	1	
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		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		2.56	1	
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		1.98			2.28	1		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			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	1		2.62	1	
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	1		2.06			2.36	1		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	1		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	1		2.11			2.41			2.71		
0.32			0.62			0.92			1.22			1.52			1.82			2.12			2.42	1		2.72		
0.33			0.63			0.93			1.23			1.53	1	↑	1.83	2		2.13			2.43					
0.34			0.64			0.94			1.24			1.54		FGV	1.84	1		2.14	1	↑	2.44	1		2.76	1	
0.35			0.65			0.95			1.25			1.55			1.85			2.15		Inert	2.45					
0.36			0.66			0.96			1.26			1.56			1.86		FGV	2.16			2.46			3.18	1	
0.37			0.67			0.97			1.27			1.57			1.87	1	↓	2.17			2.47			3.56	1	
0.38			0.68			0.98			1.28			1.58	1		1.88			2.18			2.48	1				Inert
0.39			0.69			0.99			1.29			1.59			1.89			2.19			2.49			4.70	1	↓

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

Sample Number..T8904....Well Name...UNIVERSITY OF TASMANIA, Drillhole T...WOODY ISLAND SILTSTONE......Depth...T676.3m........ .... SampleType....Core...
Date. ..15/.11/ 2002.. Op..SPR........ FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite, Cav - Cavings, DA - Drilling Mud Additives MICR D:\RWORK\utasvrw.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	1	
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	↑	1.92	1		2.22	2		2.52		
0.13			0.43			0.73			1.03			1.33			1.63		Inert	1.93			2.23			2.53		
0.14			0.44			0.74			1.04			1.34			1.64	1		1.94	1		2.24	1		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		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			0.81			1.11			1.41	1		1.71			2.01			2.31			2.61		
0.22			0.52			0.82			1.12			1.42			1.72			2.02	1		2.32	1		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		FGV	1.74			2.04	2		2.34			2.64	1	
0.25			0.55			0.85			1.15			1.45	1	↓	1.75			2.05			2.35			2.65		
0.26			0.56			0.86			1.16	1	↑	1.46			1.76			2.06			2.36	2		2.66		
0.27			0.57			0.87			1.17		FGV	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	1		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		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		1.52			1.82			2.12			2.42	1		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	1		2.74	1	
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	1		2.46	1		2.76		
0.37			0.67			0.97			1.27			1.57			1.87			2.17			2.47					
0.38			0.68			0.98			1.28			1.58			1.88			2.18			2.48					Inert
0.39			0.69			0.99			1.29			1.59			1.89			2.19			2.49			4.74	1	↓

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

Sample Number..T8905.....Well Name...UNIVERSITY OF TASMANIA, S-5 OUTCROP....WOODY ISLAND SILTSTONE.......... Depth..-........ .... SampleType....O/C....

Date. ..15/.11/ 2002.. Op..SPR........ FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite, Cav - Cavings, DA - Drilling Mud Additives MICR D:\RWORK\utasvrw.doc

KK # Ref#.	48503 Depth (m)	$R_v$max Mean	Range	SD	N	UNIVERSITY OF TASMANIA Sample description including liptinite fluorescence maceral abundances, mineral fluorescence
						DRILLHOLE DR - LIFFEY GROUP
T9668 Core	234	0.55	0.48-0.64	0.039	33	Sparse sporinite yellowish orange, rare cutinite orange, rare telalginite yellow to yellowish orange. (Sandstone, with localised coal scares. Within selected parts of the core, dom abundant, I>V>L. Inertinite and vitrinite abundant, liptinite sparse. Most of the coaly inclusions represent inertinite or vitrinite layers, but some represent redeposited peat fragments with layers containing detrovitrinite, inertinite and liptinite. The telalginite is derived from very small colonies of *Botryococcus spp.* Rare oil inclusions within quartz grains. Mineral fluorescence patchy, bright orange to weak dull orange. Pyrite abundant.)
T9669 Core	246	0.62	0.51-0.68	0.050	27	Sparse sporinite yellowish orange. (Sandstone, with localised coal scares. Within selected parts of the core, dom abundant, I>V>L. Inertinite and vitrinite abundant, liptinite sparse. Most of the coaly inclusions represent inertinite or vitrinite layers, but some represent redeposited peat fragments with layers containing detrovitrinite, inertinite and liptinite and some of the inertinite and telovitrinite layers represent reworked peat rather than single phytoclasts. Large sporangium present. Mineral fluorescence patchy, bright orange to weak dull orange. Pyrite abundant.)
						DRILLHOLE T - LIFFEY GROUP
T9670 Core	384.5	-	-	-	-	Fluorescing liptinite absent. (Siltstone, carbonaceous. Dom abundant, I, V and L absent. The inertinite grains appear corroded and include a number of very highly reflecting lenses. Rare to sparse oil inclusions within quartz grains, and some gas bubbles present within the oil inclusions. Mineral fluorescence patchy, bright orange to weak dull orange. Pyrite abundant.)
	$\overline{R}_I$max	2.67	1.24-5.12	0.849	26	
						OUTCROP - WOODY ISLAND FORMATION
T9670 Core	O/C	-	-	-	-	Rare liptodetrinite orange, probably includes some poorly preserved sporinite. (Mudstone, calcareous. Dom rare, L>I, V absent. Liptinite and inertinite rare, vitrinite absent. Sparse yellow oil inclusions within quartz grains. Mineral fluorescence mostly very weak dull orange locally brighter near oil inclusions. Pyrite abundant.)
	$\overline{R}_I$max	3.52	-	-	1	

The DR sample contain common to abundant vitrinite that yields excellent quality vitrinite reflectance data. Small amounts of telalginite are present in the shallower of the two samples.

The sample from Drillhole T represents a facies present in many Gondwana sequences where silty lithologies contain abundant inertinite but no other macerals. The mean inertinite reflectance is very high but the lower reflecting fields are undoubtedly inertinite and are not vitrinite. Thus, the vitrinite reflectance must be below 1.24% and this is consistent with the patchy mineral fluorescence that was found.

The outcrop sample also does not contain any vitrinite and even inertinite is rare. The reason for the dark colouration is not clear. Oil inclusions are present and indicate that the oil was gassy as free gas bubbles are present. The liptinite that is present would be consistent with a vitrinite reflectance of about 0.75% to 0.85%.

ACC 5 May 2004

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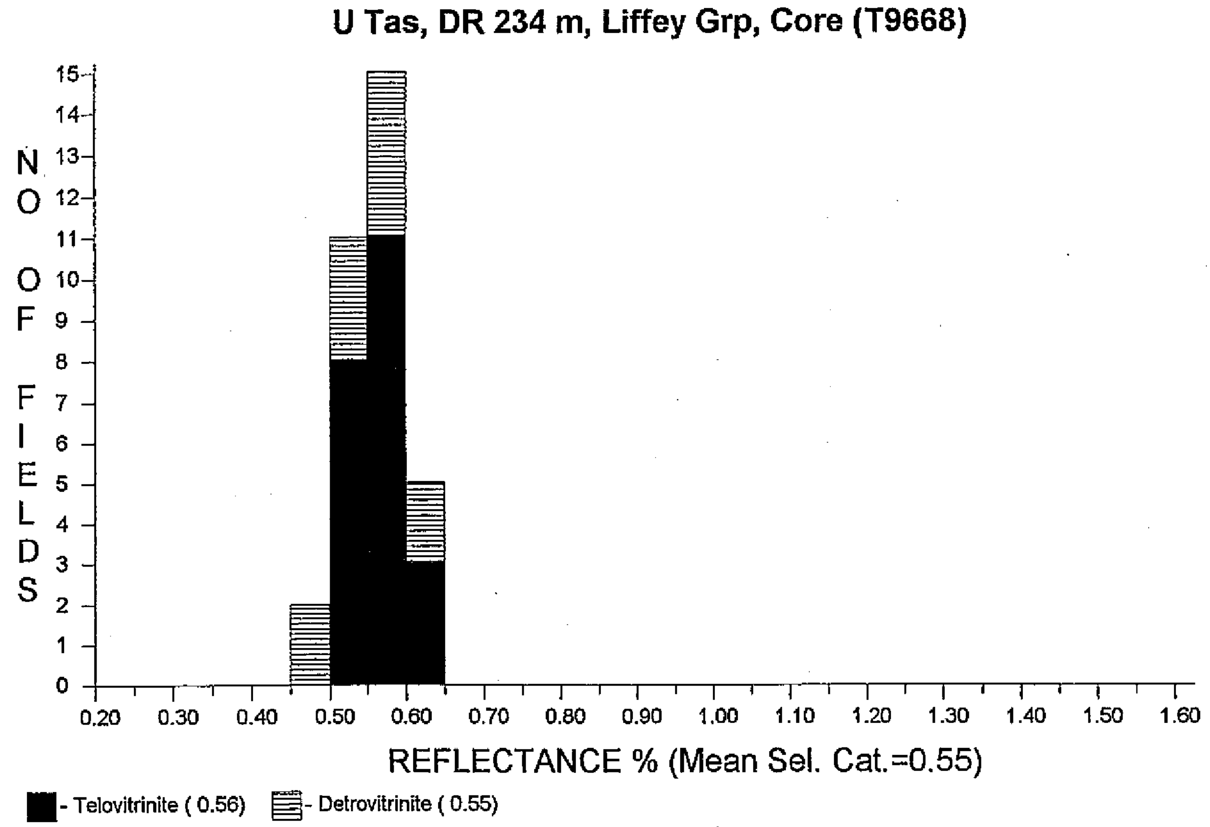

Category	No. of Readings	Mean	Standard Deviation
Telovitrinite	22	0.56	0.034
Detrovitrinite	11	0.55	0.045
Total:	33	0.55	0.039

Selected categories: Telovitrinite, Detrovitrinite.

No. of readings:	33
Mean of selected categories:	0.55
Standard deviation of selected categories:	0.039

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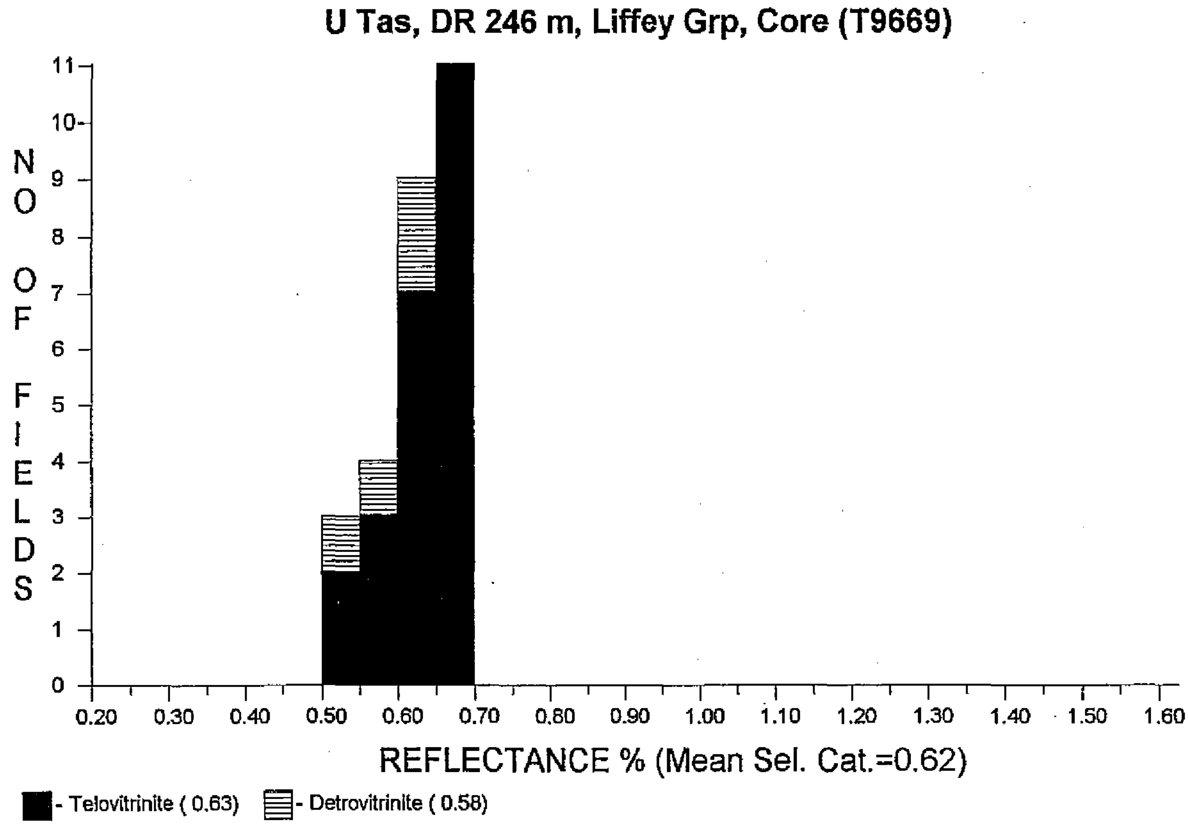

Category	**No. of Readings**	**Mean**	**Standard Deviation**
Telovitrinite	23	0.63	0.047
Detrovitrinite	4	0.58	0.045
Total:	27	0.62	0.050

Selected categories: Telovitrinite, Detrovitrinite.

No. of readings:	27
Mean of selected categories:	0.62
Standard deviation of selected categories:	0.050

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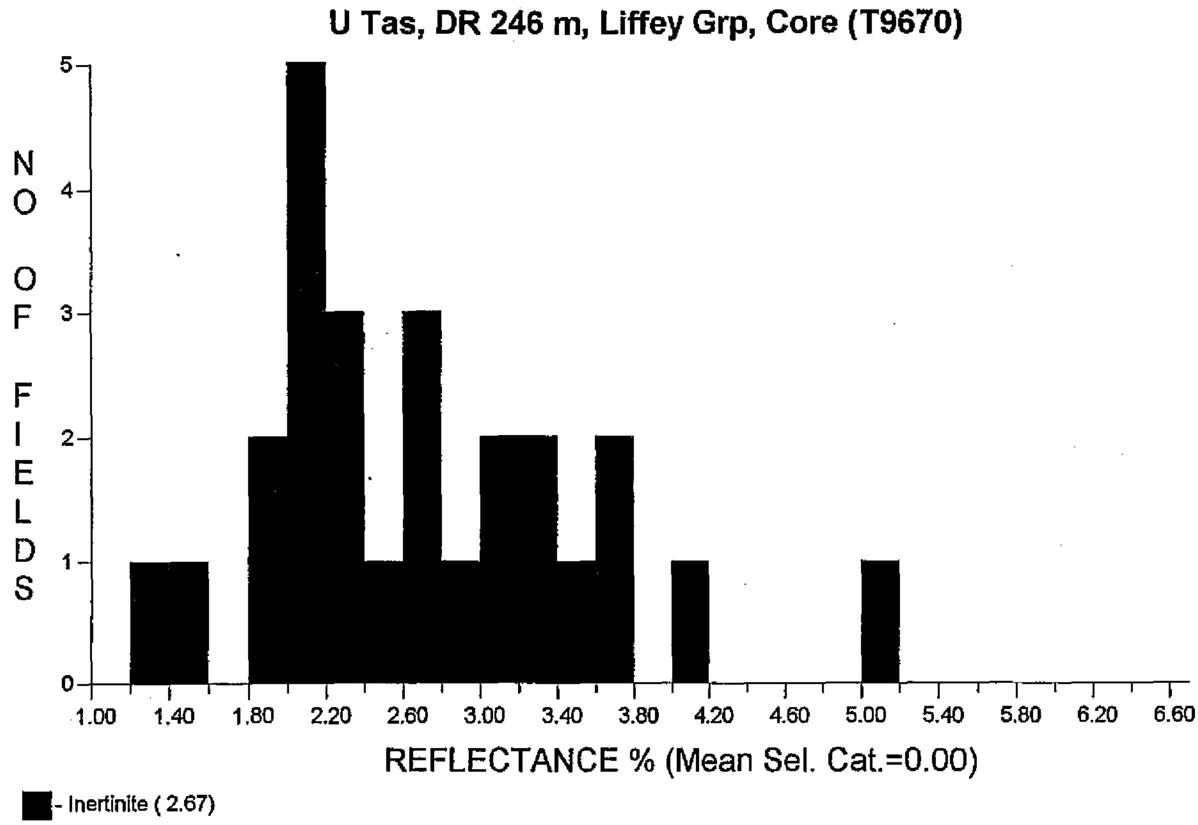

Category	No. of Readings	Mean	Standard Deviation
Inertinite	26	2.67	0.849
Total:	26	2.67	0.849

Selected categories:

No. of readings:	0
Mean of selected categories:	0.00
Standard deviation of selected categories:	0.000

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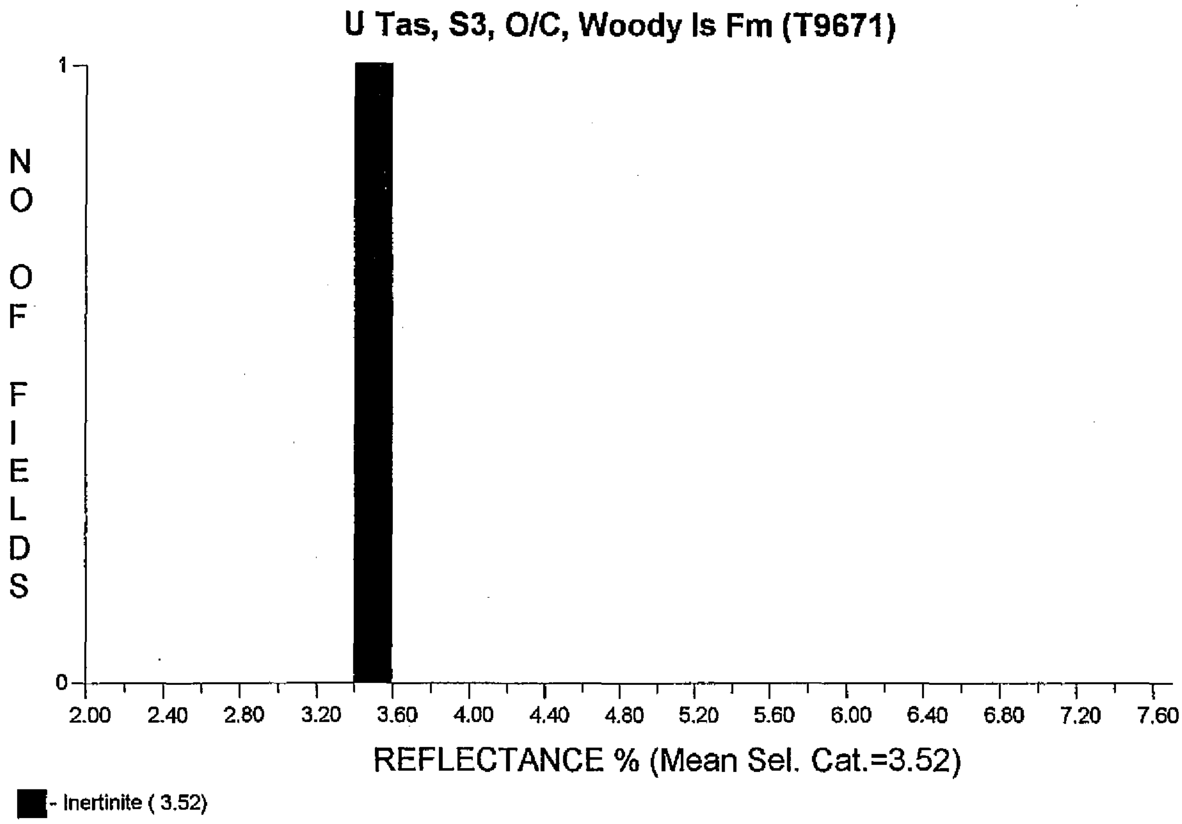

Category	No. of Readings	Mean	Standard Deviation
Inertinite	1	3.52	0.000
Total:	1	3.52	0.000

Selected categories: Inertinite.

No. of readings:	1
Mean of selected categories:	3.52
Standard deviation of selected categories:	0.000

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			1.94			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	1	↑	0.78			1.08			1.38			1.68			1.98			2.28			2.58		
0.19			0.49	1	FGV	0.79			1.09			1.39			1.69			1.99			2.29			2.59		
0.20			0.50	4		0.80			1.10			1.40			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	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	4		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	5		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	4		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	1		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			1.22			1.52			1.82			2.12			2.42			2.72		
0.33			0.63	1	FGV	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			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 2.0 %		INERTINITE 3.5 %						LIPTINITE 0.2 %								OIL DROPS <0.1	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor 0.2	Cut <0.1	Sub	Res	Ltd	Bituminite	Telalginite <0.1	Lamalginite	Oil cut	

Sample Number..T9668....Well Name..University of Tasmania, Catherine Reid DR ....LIFFEY GROUP.................. Depth...234. m....... .... SampleType....Core...
Date. ..05/.05/ 2004.. Op..ACC....... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite, Cav - Cavings, DA - Drilling Mud Additives MICR D:\RWORK.ms6\ UT04VRW.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			1.94			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			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	2	↑	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	1	|	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	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	1	|	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		|	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	1	|	0.91			1.21			1.51			1.81			2.11			2.41			2.71		
0.32			0.62	5	|	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	2	|	0.94			1.24			1.54			1.84			2.14			2.44			2.74		
0.35			0.65	2	|	0.95			1.25			1.55			1.85			2.15			2.45			2.75		
0.36			0.66	4	|	0.96			1.26			1.56			1.86			2.16			2.46			2.76		
0.37			0.67	2	FGV	0.97			1.27			1.57			1.87			2.17			2.47			2.77		
0.38			0.68	3	↓	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 3.0 %						LIPTINITE 0.3 %								OIL DROPS	BITUMEN
TV	DV	Sfus	Scler	Fus	Macr	ID	Micr	Spor 0.3	Cut	Sub	Res	Ltd	Bituminite	Telalginite	Lamalginite	Oil cut	

Sample Number..T9669....Well Name..University of Tasmania, Catherine Reid DR ....LIFFEY GROUP................... Depth...246. m...... .... SampleType....Core...
Date. ..05/.05/ 2004.. Op..ACC....... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite, Cav - Cavings, DA - Drilling Mud Additives MICR D:\RWORK.ms6\ UT04VRW.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	R	No Read	Pop Range
1.00			1.30			1.60			1.90			2.20			2.50	1		2.80			3.10			3.40					
1.01			1.31			1.61			1.91			2.21			2.51			2.81			3.11			3.41					
1.02			1.32			1.62			1.92			2.22			2.52			2.82			3.12	1		3.42	1		4.04	1	
1.03			1.33			1.63			1.93			2.23			2.53			2.83			3.13			3.43					
1.04			1.34			1.64			1.94			2.24			2.54			2.84			3.14			3.44			4.94		
1.05			1.35			1.65			1.95			2.25			2.55			2.85			3.15			3.45			4.95		
1.06			1.36			1.66			1.96			2.26	2		2.56			2.86			3.16			3.46			4.96		
1.07			1.37			1.67			1.97			2.27			2.57			2.87			3.17			3.47			4.97		
1.08			1.38			1.68			1.98	1		2.28			2.58			2.88			3.18			3.48			4.98		
1.09			1.39			1.69			1.99			2.29			2.59			2.89			3.19			3.49			4.99		
1.10			1.40			1.70			2.00			2.30			2.60	1		2.90			3.20			3.50			5.70		
1.11			1.41			1.71			2.01			2.31			2.61			2.91			3.21			3.51			5.00		
1.12			1.42			1.72			2.02	3		2.32	1		2.62	1		2.92			3.22			3.52			5.01		
1.13			1.43			1.73			2.03			2.33			2.63			2.93			3.23			3.53			5.02		
1.14			1.44	1		1.74			2.04	1		2.34			2.64			2.94			3.24			3.54			5.03		
1.15			1.45			1.75			2.05			2.35			2.65			2.95			3.25			3.55			5.04		
1.16			1.46			1.76			2.06	1		2.36			2.66			2.96	1		3.26	1		3.56			5.05		
1.17			1.47			1.77			2.07			2.37			2.67			2.97			3.27			3.57			5.06		
1.18			1.48			1.78			2.08			2.38			2.68			2.98			3.28			3.58			5.07		
1.19			1.49			1.79			2.09			2.39			2.69			2.99			3.29			3.59			5.08		
1.20			1.50			1.80			2.10			2.40			2.70			3.00	1		3.30			3.60	1		5.09		
1.21			1.51			1.81			2.11			2.41			2.71			3.01			3.31			3.61			5.10		
1.22			1.52			1.82			2.12			2.42			2.72	1		3.02			3.32			3.62			5.11		Inert
1.23			1.53			1.83			2.13			2.43			2.73			3.03			3.33			3.63			5.12	1	↓
1.24	1	↑	1.54			1.84			2.14			2.44			2.74			3.04			3.34			3.64			5.13		
1.25		Inert	1.55			1.85			2.15			2.45			2.75			3.05			3.35			3.65			5.14		
1.26			1.56			1.86	1		2.16			2.46			2.76			3.06			3.36	1		3.66	1		5.15		
1.27			1.57			1.87			2.17			2.47			2.77			3.07			3.37			3.67			5.16		
1.28			1.58			1.88			2.18			2.48			2.78			3.08			3.38			3.68			5.17		
1.29			1.59			1.89			2.19			2.49			2.79			3.09			3.39			3.69			5.18		

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

Sample Number..T9670....Well Name..University of Tasmania, Catherine Reid ..T ....LIFFEY GROUP.................. Depth...384.5.m.................. SampleType....Core...
Date. ..05/.05/ 2004.. Op..ACC....... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite, Cav - Cavings, DA - Drilling Mud Additives

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	R	No Read	Pop Range
2.20			2.50			2.80			3.10			3.40			3.70			4.00			4.30			4.60			4.90		
2.21			2.51			2.81			3.11			3.41			3.71			4.01			4.31			4.61			4.91		
2.22			2.52			2.82			3.12			3.42			3.72			4.02			4.32			4.62			4.92		
2.23			2.53			2.83			3.13			3.43			3.73			4.03			4.33			4.63			4.93		
2.24			2.54			2.84			3.14			3.44			3.74			4.04			4.34			4.64			4.94		
2.25			2.55			2.85			3.15			3.45			3.75			4.05			4.35			4.65			4.95		
2.26			2.56			2.86			3.16			3.46			3.76			4.06			4.36			4.66			4.96		
2.27			2.57			2.87			3.17			3.47			3.77			4.07			4.37			4.67			4.97		
2.28			2.58			2.88			3.18			3.48			3.78			4.08			4.38			4.68			4.98		
2.29			2.59			2.89			3.19			3.49			3.79			4.09			4.39			4.69			4.99		
2.30			2.60			2.90			3.20			3.50			3.80			4.10			4.40			4.70			5.70		
2.31			2.61			2.91			3.21			3.51			3.81			4.11			4.41			4.71			5.00		
2.32			2.62			2.92			3.22			3.52	1	Inert	3.82			4.12			4.42			4.72			5.01		
2.33			2.63			2.93			3.23			3.53			3.83			4.13			4.43			4.73			5.02		
2.34			2.64			2.94			3.24			3.54			3.84			4.14			4.44			4.74			5.03		
2.35			2.65			2.95			3.25			3.55			3.85			4.15			4.45			4.75			5.04		
2.36			2.66			2.96			3.26			3.56			3.86			4.16			4.46			4.76			5.05		
2.37			2.67			2.97			3.27			3.57			3.87			4.17			4.47			4.77			5.06		
2.38			2.68			2.98			3.28			3.58			3.88			4.18			4.48			4.78			5.07		
2.39			2.69			2.99			3.29			3.59			3.89			4.19			4.49			4.79			5.08		
2.40			2.70			3.00			3.30			3.60			3.90			4.20			4.50			4.80			5.09		
2.41			2.71			3.01			3.31			3.61			3.91			4.21			4.51			4.81			5.10		
2.42			2.72			3.02			3.32			3.62			3.92			4.22			4.52			4.82			5.11		
2.43			2.73			3.03			3.33			3.63			3.93			4.23			4.53			4.83			5.12		
2.44			2.74			3.04			3.34			3.64			3.94			4.24			4.54			4.84			5.13		
2.45			2.75			3.05			3.35			3.65			3.95			4.25			4.55			4.85			5.14		
2.46			2.76			3.06			3.36			3.66			3.96			4.26			4.56			4.86			5.15		
2.47			2.77			3.07			3.37			3.67			3.97			4.27			4.57			4.87			5.16		
2.48			2.78			3.08			3.38			3.68			3.98			4.28			4.58			4.88			5.17		
2.49			2.79			3.09			3.39			3.69			3.99			4.29			4.59			4.89			5.18		

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

Sample Number..T9671....Well Name..University of Tasmania, Catherine Reid Outcrop Woody Island Formation............ Depth...Outcrop..... .... SampleType....Core...
Date. ..05/.05/ 2004.. Op..ACC....... FGV - First Generation Vitrinite, RV - Reworked Vitrinite, BTT - Bituminite, B - Bitumen, Inert - Inertinite, Cav - Cavings, DA - Drilling Mud Additives MICR D:\RWORK.ms6\ UT04VRW.doc

ACS

LABORATORIES

PTY. LTD.

ROUTINE CORE ANALYSIS FINAL REPORT

of

SLABBED CORE

for

UNIVERSITY OF TASMANIA

by

ACS LABORATORIES PTY LTD

ACS
LABORATORIES
PTY LTD

16 August, 2002

University of Tasmania
School of Earth Sciences
Grosvenor Crescent
SANDY BAY TAS 7005

Attention: Dr Catherine Reid

FINAL REPORT: 0338-02

CLIENT REFERENCE: Purchase Order No. 37987

MATERIAL: Slabbed Core

WORK REQUIRED: Porosity and Permeability

Please direct technical enquiries regarding this work to the signatories below under whose supervision the work was carried out.

IAN J MANGELSDORF
Core Properties and
Field Services Supervisor

Head Office: 8 Cox Road, Windsor Qld 4030, Australia
☎: 61 7 3357 1133 Facsimile: 61 7 3357 1100
E-mail: acs.bris@acslabs.com.au
ACS Laboratories Pty Ltd
ABN: 81 008 273 005

CONTENTS

1. SAMPLE TEST PROCEDURES

1.1 Sample Preparation

Six pieces of slabbed core where received at ACS laboratories Brisbane facility on 12 August 2002. One core plug of 1" diameter was drilled from each core piece using water as a bit coolant.

Samples were trimmed to right cylinders of maximum length using a diamond impregnated cutting blade.

Drying was performed in a humidity oven at 60°C and 40% relative humidity.

1.2 Helium Injection Porosity

The plug was sealed in a matrix cup and a known volume of helium at 100 psi reference pressure was introduced to the cup. From the resultant pressure the unknown volume, i.e. the grain volume, was calculated using Boyles Law.

Bulk volume was determined by mercury immersion

$$P_1 V_1 = P_2 V_2$$

$$\Rightarrow \quad P_1 Vr = P_2 (Vr + Vc - Vg)$$

$$Vp = Vb - Vg$$

$$Ambient\ Porosity\ \% = \frac{Vp}{Vb} \times 100\%$$

where
P_1 = *initial pressure (psig)*
P_2 = *final pressure (psig)*
Vr = *reference cell volume (cm^3)*
Vc = *matrix cup volume (cm^3)*
Vg = *grain volume (cm^3)*
Vp = *pore volume (cm^3)*
Vb = *bulk volume (cm^3)*

1.3 Air Permeability

The samples were placed in a Hassler cell at a confining pressure of 300 psig. This pressure is used to prevent bypassing of air around the sample when the measurement is made.

During the measurement a known air pressure is applied to the upstream face of the sample, creating a flow of air through the sample. Permeability for each sample is then calculated using Darcy's Law, through knowledge of the upstream pressure and flow rate during the test, the viscosity of air and the plug dimensions.

$$Ka = \frac{2000.BP.\mu.q.L}{(P_1^2 - P_2^2).A}$$

where

Ka	=	*air permeability (milliDarcy's)*
BP	=	*barometric pressure (atmospheres)*
μ	=	*gas viscosity (cP)*
q	=	*flow rate (cm^3/s) at barometric pressure*
L	=	*sample length (cm)*
P_1	=	*upstream pressure (atmospheres)*
P_2	=	*downstream pressure (atmospheres)*
A	=	*sample cross sectional area (cm^2)*

1.4 Apparent Grain Density

The apparent grain density was calculated by dividing the weight of the plug by the grain volume, determined from the helium injection porosity measurement.

$$\rho = \frac{Wt}{Vg}$$

where

ρ	=	*grain density (g/cm^3*
Wt	=	*weight of sample (g)*
Vg	=	*grain volume (cm^3)*

CORE ANALYSIS REPORT

Client : University of Tasmania
Job : Various Samples

Date : 15/08/2002
File : 0338-02
Analysts : kw

Sample Number	**Sample Depth** *(metres)*	**Porosity Helium** *(percent)*	**Grain Density** *(g/cm³)*	**Permeability to Air** *(mD)*	**Remarks**
T1	364.50	10.0	2.64	0.12	1.8 cm
T2	370.70	7.6	2.68	0.05	1.8 cm
T3	370.75	7.0	2.67	0.05	1.8 cm
H1	853.25	8.7	2.68	0.06	2.5 cm
H2	862.50	4.1	2.68	0.04	2.6 cm
H3	869.30	5.6	2.67	0.05	2.6 cm

total $791.00

16 September, 2002

University of Tasmania
School of Earth Sciences
Grosvenor Crescent
SANDY BAY TAS 7005

Attention: Dr Catherine Reid

FINAL REPORT: 0340-02

CLIENT REFERENCE:	Purchase Order No. 38425
MATERIAL:	Slabbed Core
WORK REQUIRED:	Porosity and Permeability

Please direct technical enquiries regarding this work to the signatories below under whose supervision the work was carried out.

KEVIN FLYNN
General Manager

Head Office: 8 Cox Road, Windsor Qld 4030, Australia
☎: 61 7 3357 1133 Facsimile: 61 7 3357 1100
E-mail: acs.bris@acslabs.com.au

ACS Laboratories Pty Ltd
ABN: 81 008 273 005

CONTENTS

CHAPTERS **PAGE**

1. SAMPLE TEST PROCEDURES

1.1 Sample Preparation

Three pieces of slabbed core where received at ACS laboratories Brisbane facility on 2 September 2002. One core plug of 1" diameter was drilled from each core piece using water as a bit coolant.

Samples were trimmed to right cylinders of maximum length using a diamond impregnated cutting blade.

Drying was performed in a humidity oven at 60°C and 40% relative humidity.

1.2 Helium Injection Porosity

The plug was sealed in a matrix cup and a known volume of helium at 100 psi reference pressure was introduced to the cup. From the resultant pressure the unknown volume, i.e. the grain volume, was calculated using Boyles Law.

Bulk volume was determined by mercury immersion

$$P_1 V_1 = P_2 V_2$$

$$\Rightarrow \quad P_1 Vr = P_2 (Vr + Vc - Vg)$$

$$Vp = Vb - Vg$$

$$Ambient\ Porosity\ \% = \frac{Vp}{Vb} \times 100\%$$

where P_1 = *initial pressure (psig)*
P_2 = *final pressure (psig)*
Vr = *reference cell volume* (cm^3)
Vc = *matrix cup volume* (cm^3)
Vg = *grain volume* (cm^3)
Vp = *pore volume* (cm^3)
Vb = *bulk volume* (cm^3)

1.3 Air Permeability

The samples were placed in a Hassler cell at a confining pressure of 300 psig. This pressure is used to prevent bypassing of air around the sample when the measurement is made. As sample Q19.4 was fractured the sample was mounted with resin.

During the measurement a known air pressure is applied to the upstream face of the sample, creating a flow of air through the sample. Permeability for each sample is then calculated using Darcy's Law, through knowledge of the upstream pressure and flow rate during the test, the viscosity of air and the plug dimensions.

$$Ka = \frac{2000.BP.\mu.q.L}{(P_1^2 - P_2^2).A}$$

where

where	Ka	=	*air permeability (milliDarcy's)*
	BP	=	*barometric pressure (atmospheres)*
	μ	=	*gas viscosity (cP)*
	q	=	*flow rate (cm^3/s) at barometric pressure*
	L	=	*sample length (cm)*
	P_1	=	*upstream pressure (atmospheres)*
	P_2	=	*downstream pressure (atmospheres)*
	A	=	*sample cross sectional area (cm^2)*

1.4 Apparent Grain Density

The apparent grain density was calculated by dividing the weight of the plug by the grain volume, determined from the helium injection porosity measurement.

$$\rho = \frac{Wt}{Vg}$$

where	ρ	=	*grain density (g/cm^3*
	Wt	=	*weight of sample (g)*
	Vg	=	*grain volume (cm^3)*

CORE ANALYSIS REPORT

Client :University of Tasmania
Job :Various Samples

Date :16-09-02
File :0340-02
Analysts :kw

Sample Number	Sample Type	Porosity Helium *(percent)*	Grain Density *(g/cm^3)*	Permeability to Air *(mD)*	Remarks
Q6.4	1" Diameter Core Plug	14.7	2.66	1.80	
Q14.9	1" Diameter Core Plug	9.9	2.70	0.21	Frac
Q19.4	1" Diameter Core Plug	8.5	2.57	0.21	Frac, Mounted

17 October, 2002

University of Tasmania
School of Earth Sciences
Grosvenor Crescent
SANDY BAY TAS 7005

Attention: Dr Catherine Reid

FINAL REPORT: 0343-02

CLIENT REFERENCE: Purchase Order No. 39004

MATERIAL: Slabbed Core

WORK REQUIRED: Porosity and Permeability

Please direct technical enquiries regarding this work to the signatories below under whose supervision the work was carried out.

KEVIN FLYNN
General Manager

1. SAMPLE TEST PROCEDURES

1.1 Sample Preparation

One piece of slabbed core was received at ACS laboratories Brisbane facility on 7 October 2002. Three core plugs of 1" diameter were drilled from selected points using water as a bit coolant.

Samples were trimmed to right cylinders of maximum length using a diamond impregnated cutting blade.

Drying was performed in a humidity oven at 60°C and 40% relative humidity.

1.2 Helium Injection Porosity

The plug was sealed in a matrix cup and a known volume of helium at 100 psi reference pressure was introduced to the cup. From the resultant pressure the unknown volume, i.e. the grain volume, was calculated using Boyles Law.

The samples were then placed into individual thick walled rubber sleeves and the assembly loaded into a hydrostatic cell. With an ambient confining pressure (400 psi) applied to the sample, helium held at 100 psi reference pressure was released into the samples pore volume. The resultant pressure drop was used to determine pore volume at ambient conditions.

$$P_1 V_1 = P_2 V_2$$

$$\Rightarrow \quad P_1 Vr = P_2 (Vr + Vc - Vg)$$

$$Vb = Vp + Vg$$

$$\text{Ambient Porosity \%} = \frac{Vp}{Vb} \times 100\%$$

where
P_1 = *initial pressure (psig)*
P_2 = *final pressure (psig)*
Vr = *reference cell volume* (cm^3)
Vc = *matrix cup volume* (cm^3)
Vg = *grain volume* (cm^3)
Vp = *pore volume* (cm^3)
Vb = *bulk volume* (cm^3)

1.3 Air Permeability

The samples were placed in a Hassler cell at a confining pressure of 300 psig. This pressure is used to prevent bypassing of air around the sample when the measurement is made.

During the measurement a known air pressure is applied to the upstream face of the sample, creating a flow of air through the sample. Permeability for each sample is then calculated using Darcy's Law, through knowledge of the upstream pressure and flow rate during the test, the viscosity of air and the plug dimensions.

$$Ka = \frac{2000.BP.\mu.q.L}{(P_1^2 - P_2^2).A}$$

where
Ka = *air permeability (milliDarcy's)*
BP = *barometric pressure (atmospheres)*
μ = *gas viscosity (cP)*
q = *flow rate (cm^3/s) at barometric pressure*
L = *sample length (cm)*
P_1 = *upstream pressure (atmospheres)*
P_2 = *downstream pressure (atmospheres)*
A = *sample cross sectional area (cm^2)*

1.4 Apparent Grain Density

The apparent grain density was calculated by dividing the weight of the plug by the grain volume, determined from the helium injection porosity measurement.

$$\rho = \frac{Wt}{Vg}$$

where
ρ = *grain density (g/cm^3*
Wt = *weight of sample (g)*
Vg = *grain volume (cm^3)*

CORE ANALYSIS REPORT

Client	:University of Tasmania	**Date**	:17-10-02
Job	:Various Samples	**File**	:0343-02
		Analysts	:kw

Sample Number	**Depth** *(metres)*	**Sample Type**	**Porosity Helium** *(percent)*	**Grain Density** *(g/cm^3)*	**Permeability to Air** *(mD)*	**Remarks**
1	975.40	1" Diameter	7.5	2.62	0.03	
2	975.43	1" Diameter	31.3	2.64	15916	Sleeved
3	975.47	1" Diameter	11.8	2.63	3053	

CORE ANALYSIS FINAL REPORT

Client	: University of Tasmania		**Date**	: 06/24/2002
Job	: Various Samples		**File**	: 0333-02
			Analysts	: kw

Sample Number	**Sample Type**	**Porosity Helium** *(percent)*	**Grain Density** *(g/cm^3)*	**Permeability to Air** *(mD)*	**Remarks**
G1	1" Diameter Core Plug	2.3	2.66	0.05	1.8 cm
G2	1" Diameter Core Plug	4.3	2.68	0.05	1.6 cm
R1	1" Diameter Core Plug	10.6	2.67	0.18	1.6 cm
R2	1" Diameter Core Plug	13.6	2.66	0.43	2.0 cm
R3	1" Diameter Core Plug	14.9	2.66	8.8	2.9 cm

also have thin section.

ACS LABORATORIES PTY LTD

6 May, 2004

University of Tasmania
School of Earth Sciences
Grosvenor Crescent
SANDY BAY TAS 7005

Attention: Dr Catherine Reid

FINAL REPORT: 0358-02

CLIENT REFERENCE: Purchase Order No. 48474

MATERIAL: Slabbed Core

WORK REQUIRED: Porosity and Permeability

Please direct technical inquiries regarding this work to the signatory below under whose supervision the work was conducted.

KEVIN H FLYNN
General Manager

Head Office: 8 Cox Road, Windsor Qld 4030, Australia
☎: 61 7 3357 1133 Facsimile: 61 7 3357 1100
E-mail: acs.bris@acslabs.com.au

ACS Laboratories Pty Ltd
ABN: 81 008 273 005

1. TEST PROCEDURES

1.1 Sample Preparation

Seven pieces of slabbed core were received at ACS laboratories Brisbane facility on 27 April, 2004. A 1" diameter core plug was drilled from each core piece using water as a bit lubricant.

Samples were trimmed to right cylinders of maximum length using a diamond impregnated cutting blade.

Drying was performed in a humidity oven at 60°C and 40% relative humidity.

1.2 Helium Injection Porosity

The plug was sealed in a matrix cup and a known volume of helium at 100 psi reference pressure was introduced to the cup. From the resultant pressure the unknown volume, i.e. the grain volume, was calculated using Boyles Law. Bulk volume was determine by mercury immersion.

$$P_1 V_1 = P_2 V_2$$

$$\Rightarrow \quad P_1 Vr = P_2 (Vr + Vc - Vg)$$

$$Vp = Vb - Vg$$

$$\text{Ambient Porosity \%} = \frac{Vp}{Vb} \times 100\%$$

where
P_1 = *initial pressure (psig)*
P_2 = *final pressure (psig)*
Vr = *reference cell volume* (cm^3)
Vc = *matrix cup volume* (cm^3)
Vg = *grain volume* (cm^3)
Vp = *pore volume* (cm^3)
Vb = *bulk volume* (cm^3)

1.3 Air Permeability

The samples were placed in a Hydrostatic cell at a confining pressure of 400 psig. This pressure is used to prevent bypassing of air around the sample when the measurement is made.

During the measurement a known air pressure is applied to the upstream face of the sample, creating a flow of air through the sample. Permeability for each sample is then calculated using Darcy's Law, through knowledge of the upstream pressure and flow rate during the test, the viscosity of air and the plug dimensions.

$$Ka = \frac{2000.BP.\mu.q.L}{(P_1^2 - P_2^2).A}$$

where
Ka = *air permeability (milliDarcy's)*
BP = *barometric pressure (atmospheres)*
μ = *gas viscosity (cP)*
q = *flow rate (cm^3/s) at barometric pressure*
L = *sample length (cm)*
P_1 = *upstream pressure (atmospheres)*
P_2 = *downstream pressure (atmospheres)*
A = *sample cross sectional area (cm^2)*

1.4 Apparent Grain Density

The apparent grain density was calculated by dividing the weight of the plug by the grain volume, determined from the helium injection porosity measurement.

$$\rho = \frac{Wt}{Vg}$$

where
ρ = *grain density (g/cm^3*
Wt = *weight of sample (g)*
Vg = *grain volume (cm^3)*

CORE ANALYSIS REPORT

Client : University of Tasmania
Various Samples

Date : 6/05/2004
File : 0358-02
Analysts : kw

Sample Number		Porosity Helium *(percent)*	Grain Density *(g/cm^3)*	Permeability to Air *(mD)*	Remarks
1	B687.9	9.6	2.66	0.03	Short Plug
2	T383.6	4.8	2.59	<0.01	
3	EN182.8	3.2	2.67	<0.01	
4	EN307	15.2	2.60	3987	
5	DR263.8	13.4	2.64	166	
6	DR256.85	11.4	2.65		Fractured
7	DR246	14.0	2.64	1.06	

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16 September 2002

University of Tasmania
School of Earth Sciences
Locked Bag 1-353
LAUNCESTON TAS 7250

Attention: Catherine Reid

REPORT LQ12012

CLIENT REFERENCE: 38424

WELL NAME/RE:

MATERIAL: Rock

WORK REQUIRED: TOC & Rock Eval analysis

AUTHOR'S NAME: Carmelina Valente

Please direct technical enquiries regarding this work, to the signatory below, under whose supervision the work was carried out. This report relates specifically to the sample or samples submitted for testing.

Diane Cass
Operations Manager
Petroleum Services

dc.cm

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1. INTRODUCTION

Thirteen (13) samples were received for TOC analysis and Rock-Eval pyrolysis.

2. ANALYTICAL PROCEDURES

2.1 Total Organic Carbon (TOC)

Total organic carbon was determined by digestion of a known weight (approximately 0.2g) of powdered rock in HCl to remove carbonates, followed by combustion in oxygen in the induction furnace of a Leco WR-12 Carbon Determinator and measurement of the resultant CO_2 by infrared detection.

2.2 Rock-Eval Pyrolysis

A 100mg portion of powdered rock was analysed by the Rock-Eval pyrolysis technique (Girdel IFP-Fina Mark 2 instrument: operating mode, cycle 1). Rock-Eval pyrolysis was performed on samples with a TOC greater than 0.39%.

3. RESULTS

TOC and Rock-Eval data are listed in Table 1.

A plot of Hydrogen Index vs Tmax is presented in Figure 1.

PETROLEUM SERVICES **TABLE 1**

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Rock-Eval Pyrolysis

Report # LQ12012

Client: University of Tasmania

Well: -

Depth (m)	T Max	S1	S2	S3	S1+S2	PI	S2/S3	PC	TOC	HI	OI
S3	449	1.01	1.47	0.18	1.19	0.41	8.16	0.2	0.99	148	18
S4	388	0.28	0.62	0.22	0.90	0.31	2.81	0.07	0.39	158	56
S5	515	0.50	0.95	0.07	1.45	0.35	13.57	0.12	1.00	95	7
Q1									0.22		
Q2									0.13		
Q3	542	0.07	0.20	0.22	0.27	0.27	0.90	0.02	1.26	15	17
Q4	418	0.06	0.08	0.20	0.14	0.43	0.40	0.01	1.37	5	14
Q5	443	0.09	0.17	0.20	0.26	0.35	0.85	0.02	1.11	15	18
Q6	486	0.11	0.50	0.21	0.61	0.18	2.38	0.05	0.79	63	326
H1	458	0.41	1.49	0.10	1.90	0.22	14.90	0.15	2.24	66	4
H2	447	0.36	1.01	0.20	1.37	0.26	5.05	0.11	1.26	80	15
H3	457	0.48	0.95	0.36	1.43	0.34	2.63	0.11	0.97	97	37
H4	453	2.61	24.97	0.73	27.58	0.09	34.20	2.29	8.10	308	9

PETROLEUM SERVICES

FIGURE 1

Rock-Eval Pyrolysis

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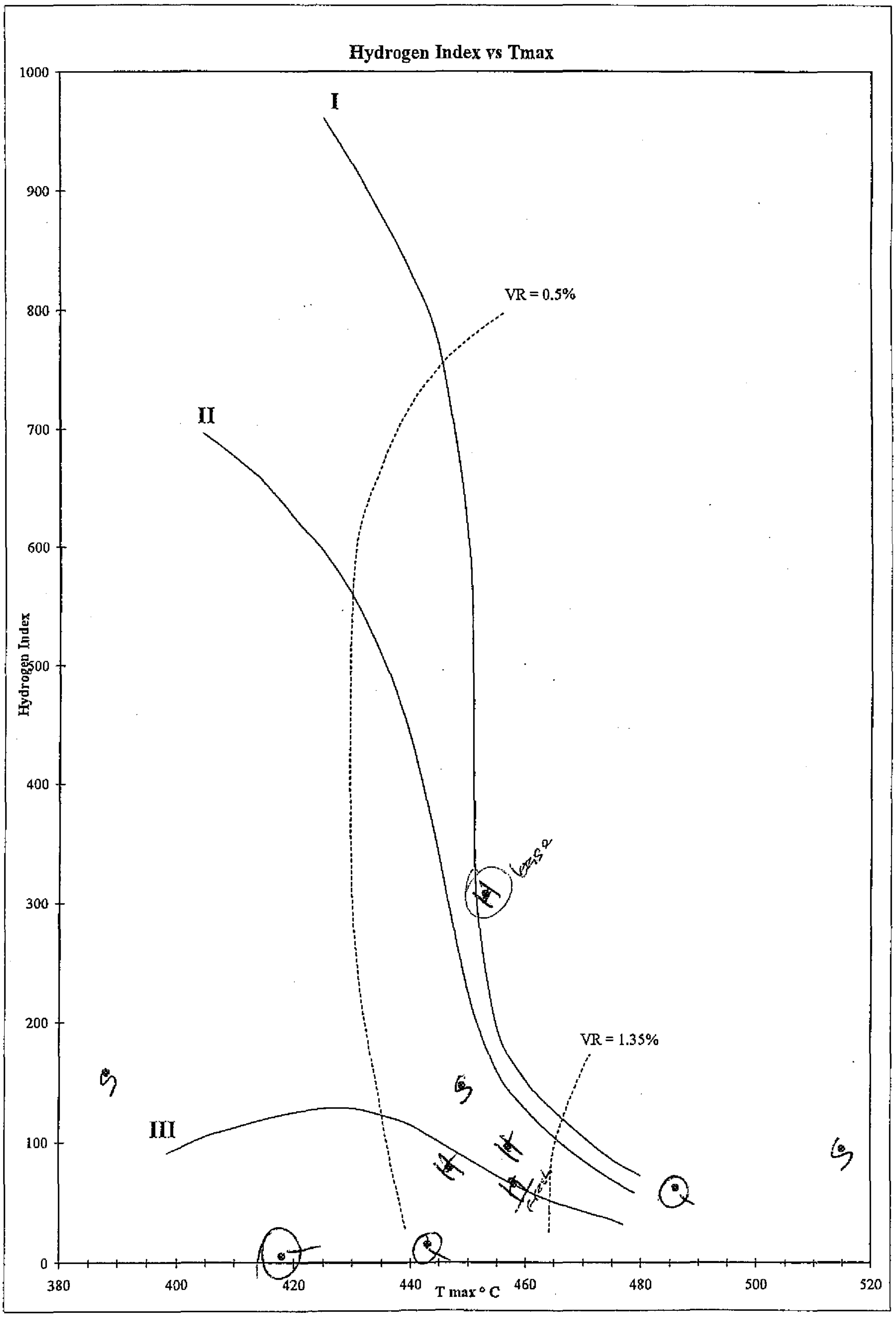
Report # LQ12012

Client: University of Tasmania

Well: -



www.amdel.com

28 March 2002

University of Tasmania
School of Earth Sciences
Locked Bag 1-353
LAUNCESTON TAS 7250

Attention: Catherine Reid

REPORT LQ11400

CLIENT REFERENCE: 34774

WELL NAME/RE: GV1-5, P1 & P2, T1 & T2

MATERIAL: Source rock

WORK REQUIRED: TOC & Rock-Eval pyrolysis

AUTHOR'S NAME: Diane Cass

Please direct technical enquiries regarding this work, to the signatory below, under whose supervision the work was carried out. This report relates specifically to the sample or samples submitted for testing.

D Cass

Diane Cass
Operations Manager
Petroleum Services

dc.cm

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1. INTRODUCTION

Nine (9) samples were submitted for TOC analysis and Rock-Eval pyrolysis.

2. PROCEDURES

2.1 Total Organic Carbon (TOC)

Total organic carbon was determined by digestion of a known weight (approximately 0.2g) of powdered rock in HCl to remove carbonates, followed by combustion in oxygen in the induction furnace of a Leco WR-12 Carbon Determinator and measurement of the resultant CO_2 by infrared detection.

2.2. Rock-Eval Pyrolysis

A 100mg portion of powdered rock was analysed by the Rock-Eval pyrolysis technique (Girdel IFP-Fina Mark 2 instrument: operating mode, cycle 1).

3. RESULTS

TOC and Rock-Eval data are listed in Table 1.

A plot of Hydrogen Index vs Tmax is presented in Figure 1.

Rock-Eval pyrograms are presented in Appendix 1.

PETROLEUM SERVICES **TABLE 1**

Rock-Eval Pyrolysis

Report # LQ11400

Client: University of Tasmania

Well: -

Sample ID		T Max	S1	S2	S3	S1+S2	PI	S2/S3	PC	TOC	HI	OI
GV 1	53m									0.30		
GV2	21.2m	425	0.07	0.40	0.22	0.47	0.15	1.81	0.03	0.76	52	28
GV3	25.7m	440	0.05	0.62	0.08	0.67	0.08	7.75	0.05	0.76	81	10
GV4	30.3m	446	0.04	0.27	0.21	0.31	0.13	1.28	0.02	0.46	58	45
GV5	34.8m	431	0.04	0.41	0.25	0.45	0.09	1.64	0.03	0.74	55	33
P1	358.45m	444	0.10	0.20	0.00	0.30	0.33	-	0.02	0.64	31	0
P2	353.2m	464	0.04	0.17	0.04	0.21	0.20	4.25	0.01	1.00	17	4
T1	383.6m	457	1.64	4.32	0.16	5.96	0.28	27.00	0.49	4.22	102	3
T2	380.7m	425	0.05	0.21	0.06	0.26	0.19	3.50	0.02	0.56	37	10

PETROLEUM SERVICES

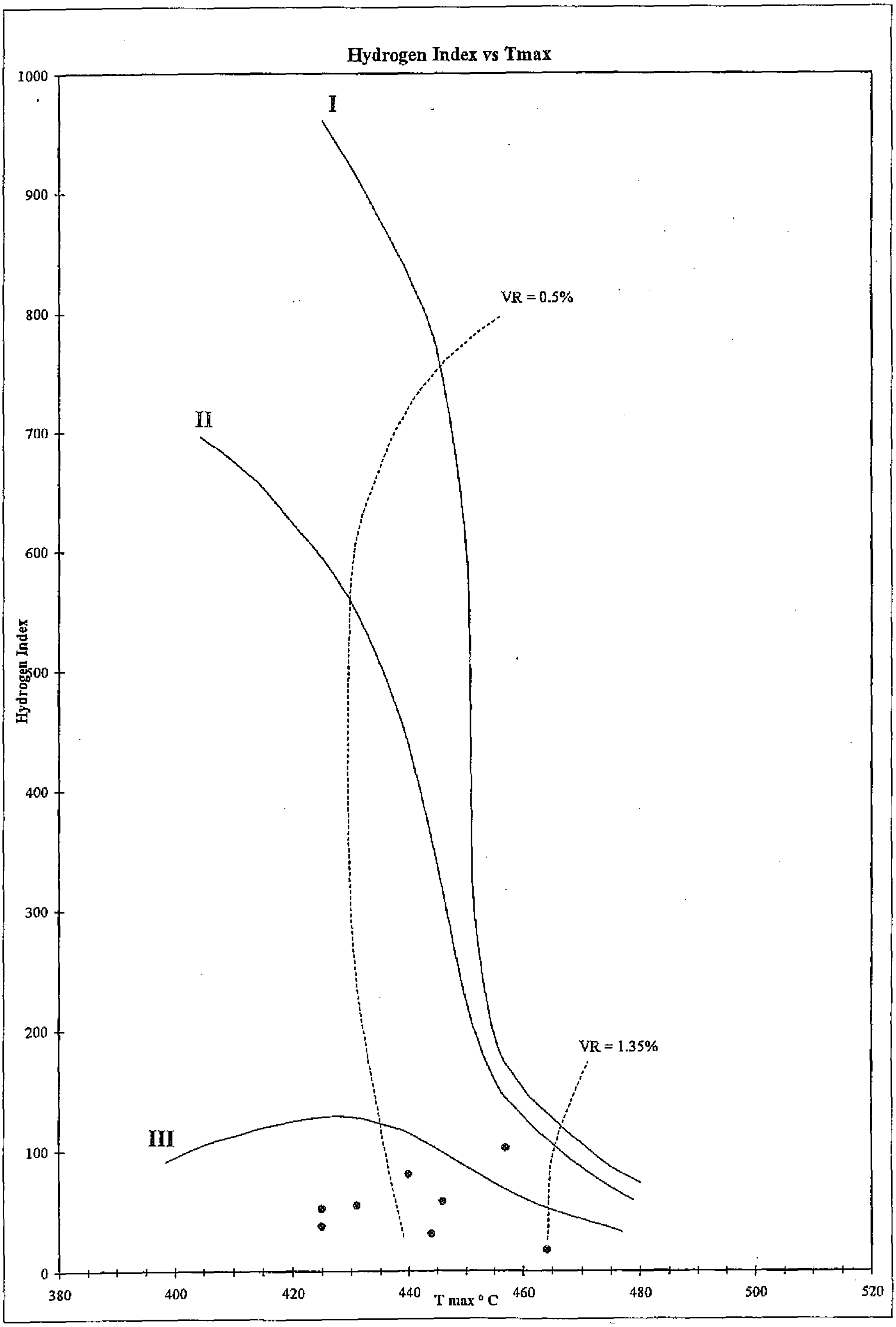
FIGURE 1

Rock-Eval Pyrolysis

Report # LQ11400

Client: University of Tasmania

Well: -



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29 July 2002

University of Tasmania
School of Earth Sciences
Locked Bag 1-353
LAUNCESTON TAS 7250

Attention: Catherine Reid

REPORT LQ11760

CLIENT REFERENCE: 36997

WELL NAME/RE:

MATERIAL: Rock

WORK REQUIRED: Rock-Eval & TOC

AUTHOR'S NAME: Carmelina Valente

Please direct technical enquiries regarding this work, to the signatory below, under whose supervision the work was carried out. This report relates specifically to the sample or samples submitted for testing.

Diane Cass
Operations Manager
Petroleum Services

dc.cm

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1. INTRODUCTION

Ten (10) samples were received for TOC and Rock-Eval analysis on 18 June 2002.

2. PROCEDURES

2.1 Total Organic Carbon (TOC)

Total organic carbon was determined by digestion of a known weight (approximately 0.2g) of powdered rock in HCl to remove carbonates, followed by combustion in oxygen in the induction furnace of a Leco WR-12 Carbon Determinator and measurement of the resultant CO_2 by infrared detection.

2.2. Rock-Eval Pyrolysis

A 100mg portion of powdered rock was analysed by the Rock-Eval pyrolysis technique (Girdel IFP-Fina Mark 2 instrument: operating mode, cycle 1). Rock-Eval pyrolysis was performed on samples with a TOC greater than 0.39%.

3. RESULTS

TOC and Rock-Eval data are listed in Table 1.

A plot of Hydrogen Index vs Tmax is presented in Figure 1.

PETROLEUM SERVICES TABLE 1

Rock-Eval Pyrolysis

Report # LQ11760

Client: University of Tasmania

Well: -

Depth (m)	T Max	S1	S2	S3	S1+S2	PI	S2/S3	PC	TOC	HI	OI
T1 676·3m Tas?	439	0.91	1.38	0.17	2.29	0.40	8.11	0.19	2.46	56	6
T2 522·5m Quam	451	0.31	0.73	0.10	1.04	0.30	7.30	0.08	0.62	117	16
R1 171·5m Liffey	444	1.91	20.75	0.26	22.66	0.08	79.80	1.88	5.40	384	4
B1 708m top bundella									0.38		
G1 300m WI	468	0.04	0.18	0.07	0.22	0.18	2.57	0.01	0.45	40	15
G2 310									0.26		
G3 320									0.34		
G4 330									0.24		
G5 340									0.32		
G6 350									0.14		

PETROLEUM SERVICES

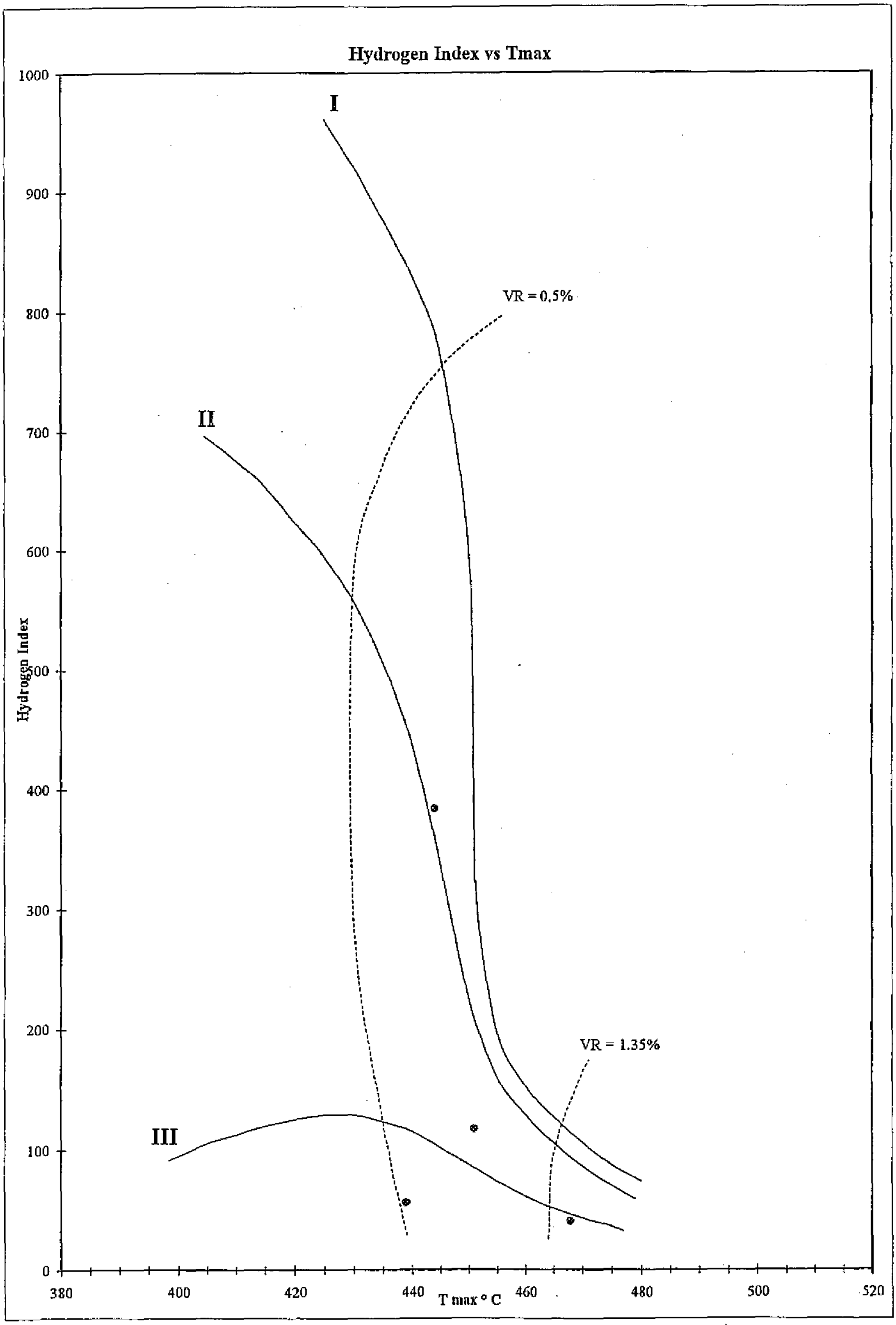
FIGURE 1

Rock-Eval Pyrolysis

Report # LQ11760

Client: University of Tasmania

Well: -



6 December 2002

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University of Tasmania
School of Earth Sciences
Locked Bag 1-353
LAUNCESTON TAS 7250
Australia

Attention: Catherine Reid

Project	**02PEAD05369**
Client Ref:	letter 14/11/02

Customer Sample ID		S8
Test/Reference	**Unit**	
Rock-Eval Pyrolysis		
Depth	m	0
T Max		466
S1- Hydrocarbon per Rock		0.35
S2- Hydrocarbon per Rock		0.76
S3- Carbon Dioxide per Rock		0.22
S1 + S2- Hydrocarbon per Rock		1.11
PI		0.32
S2/S3		3.45
PC- Hydrocarbon per Rock		0.09
TOC	%	0.60
HI- Hydrocarbon per Rock		126
OI- Carbon Dioxide per Rock		36

Amdel Ltd 35-37 Stirling Street Thebarton SA Australia 5031
30 008 127 802 Telephone: +61 8 8416 5200 Facsimile: +61 8 8234 2933

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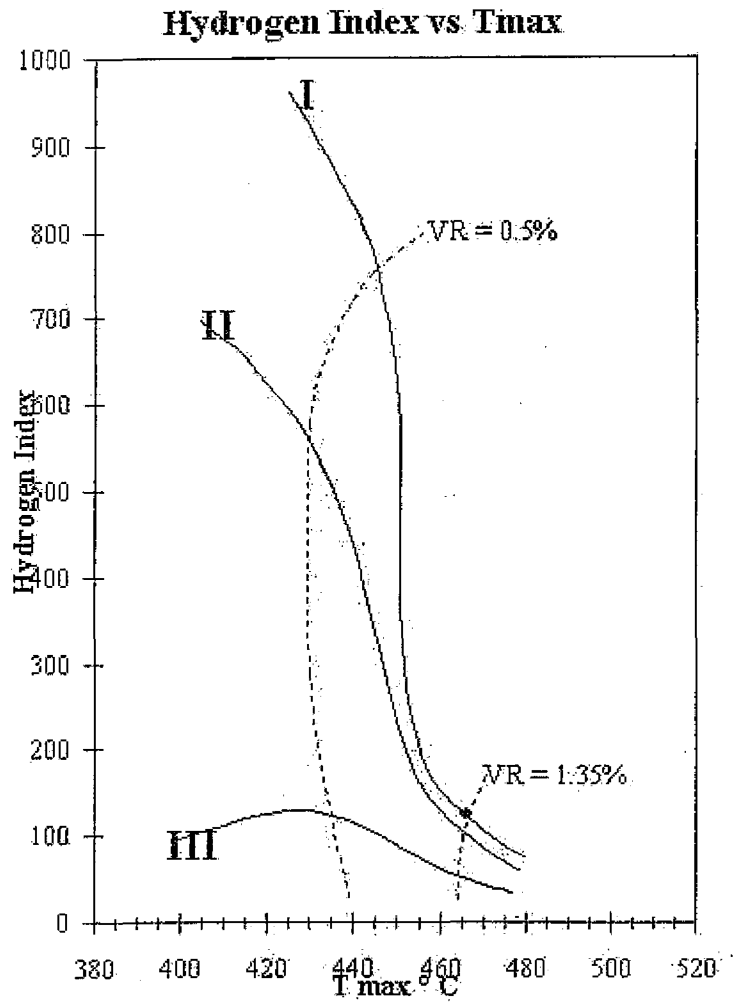
S8



Authorised By: Carmelina Valente
Petroleum Chemist

Signature:

- Indicates Not Requested ** Indicates NATA Accredited Test*

Samples will be discarded after 30 days unless otherwise notified.

The samples were not collected by Amdel staff.

Amdel Ltd 35-37 Stirling Street Thebarton SA Australia 5031
30 008 127 802 Telephone: +61 8 8416 5200 Facsimile: +61 8 8234 2933

17 February 2003

University of Tasmania
School of Earth Sciences
Locked Bag 1-353
LAUNCESTON TAS 7250
Australia
Attention: Catherine Reid

Project 03PEAD00681
Client Ref: Letter 21/01/03

Customer Sample ID		H5	H6	H7
Test/Reference	Unit			
Rock-Eval Pyrolysis				
T Max	°C	459	-	463
S1- Volatile Hydrocarbons	mg/g	0.54	-	0.46
S2- HC Generating Potential	mg/g	1.90	-	1.24
S3- Organinc Carbon Dioxide	mg/g	0.34	-	0.26
S1 + S2- Potential Yield	mg/g	2.44	-	1.70
PI - Production Index		0.22	-	0.27
S2/S3		5.58	-	4.76
PC- Pyrolysized Carbon	mg/g	0.20	-	0.14
TOC - Total Organic Carbon	Weight %	3.10	-	2.90
HI- Hydrogen Index		61	-	42
OI- Oxygen Index		10	-	8
Total Organic Carbon				
Total Organic Carbon	Weight %	3.10	0.22	2.90

Amdel Ltd 35-37 Stirling Street Thebarton SA Australia 5031
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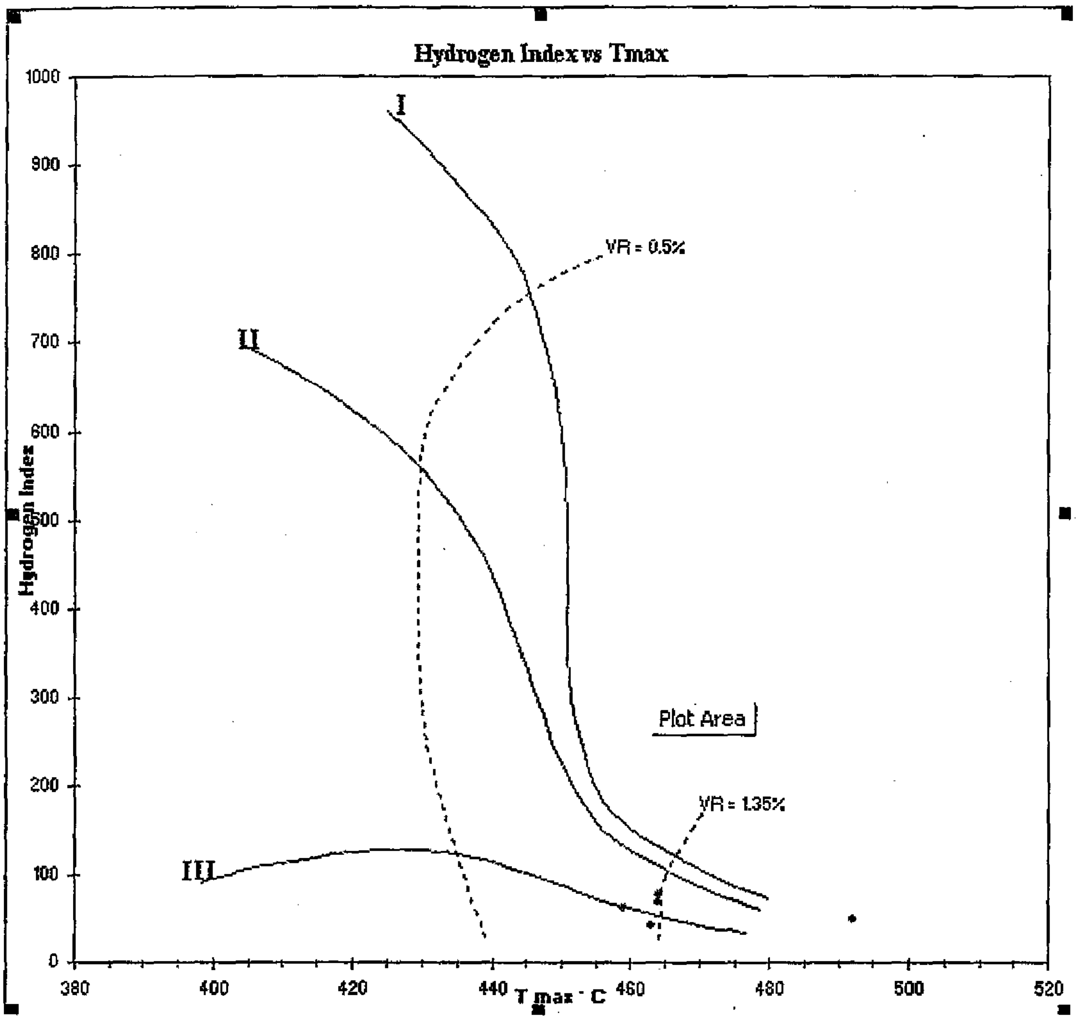
Customer Sample ID		H8	H9	H10
Test/Reference	Unit			
Rock-Eval Pyrolysis				
T Max	°C	464	464	492
S1- Volatile Hydrocarbons	mg/g	0.38	0.55	0.06
S2- HC Generating Potential	mg/g	1.84	1.51	0.61
S3- Organinc Carbon Dioxide	mg/g	0.09	0.05	0.38
S1 + S2- Potential Yield	mg/g	2.22	2.06	0.67
PI - Production Index		0.17	0.27	0.09
S2/S3		20.44	30.20	1.60
PC- Pyrolysized Carbon	mg/g	0.18	0.17	0.05
TOC - Total Organic Carbon	Weight %	2.35	2.20	1.25
HI- Hydrogen Index		78	68	48
OI- Oxygen Index		3	2	30
Total Organic Carbon				
Total Organic Carbon	Weight %	2.35	2.20	1.25

Amdel Ltd 35-37 Stirling Street Thebarton SA Australia 5031
30 008 127 802 Telephone: +61 8 8416 5200 Facsimile: +61 8 8234 2933

Graph



Authorised By: Carmelina Valente
Petroleum Chemist

Signature:

Final Report

- Indicates Not Requested ** Indicates NATA Accredited Test*

Samples will be discarded after 30 days unless otherwise notified.

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The samples were not collected by Amdel staff.

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11 May 2004

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A subsidiary of The Gribbles Group

University of Tasmania
School of Earth Sciences
Locked Bag 1-353
LAUNCESTON TAS 7250
Australia

Attention: Catherine Reid

Project **04PEAD03871**
Client Ref: Letter 20/04/04

Customer Sample ID		T3, 388.5	EN1, 182.8
Test/Reference	Unit		
Rock-Eval Pyrolysis			
Depth	m	388.5	182.8
T Max	°C	465	547
S1- Volatile Hydrocarbons (HC)	mg/g	0.41	0.32
S2- HC Generating Potential	mg/g	1.01	0.36
S3- Organic Carbon Dioxide	mg/g	0.04	0.12
S1 + S2- Potential Yield	mg/g	1.42	0.68
PI - Production Index		0.29	0.47
S2/S3		25.25	3.00
PC- Pyrolysized Carbon	mg/g	0.11	0.05
HI- Hydrogen Index		63	16
OI- Oxygen Index		2	5
Total Organic Carbon			
Total Organic Carbon	Weight %	1.58	2.18

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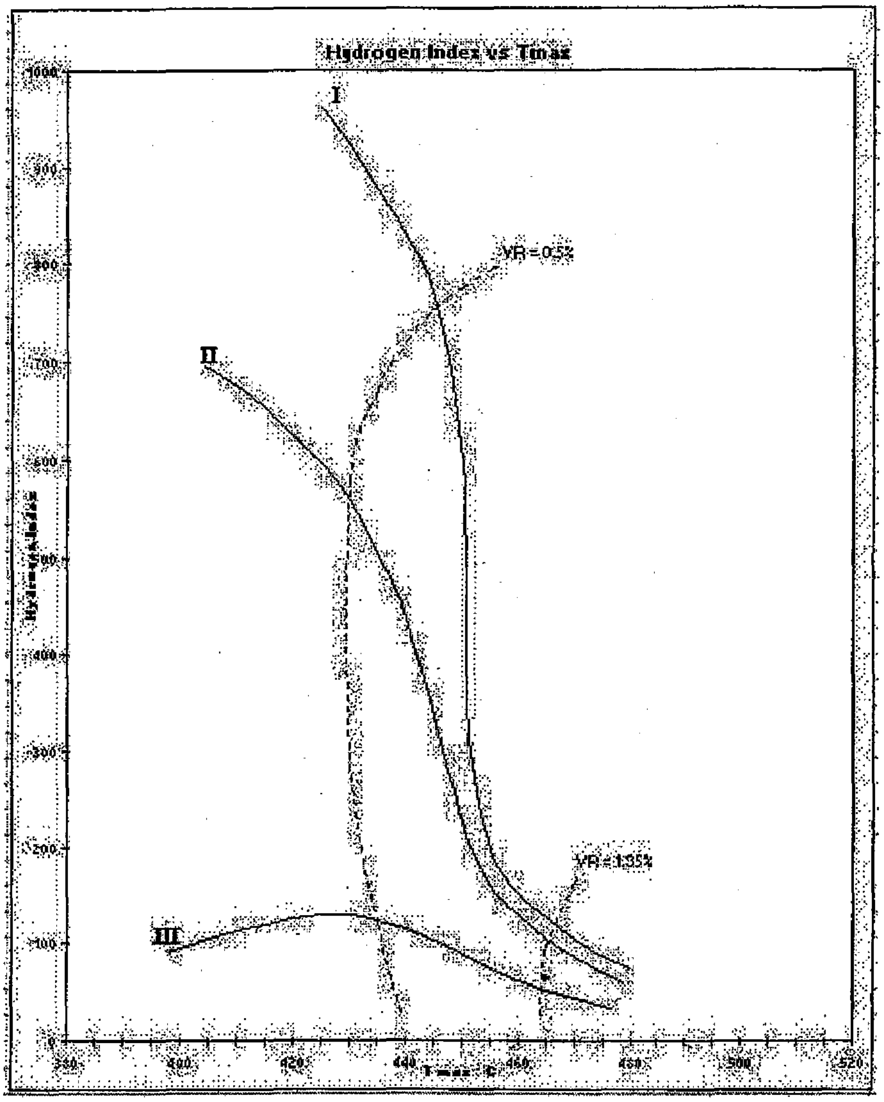
T3, 388.5 m



Authorised By: Carmelina Valente
Petroleum Chemist

Signature:

Final Report

- Indicates Not Requested ** Indicates NATA Accredited Test*

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The samples were not collected by Amdel staff.